Epson® Progression™ User's Guide Update

Please note that the memory configuration table shown on pages 3-12 and *3-13* of your *User's Guide* is incorrect. Please replace it with the following table.

SIMM configuration

Socket U11	Socket U12	Total memory
		4MB*
1MB	1MB	6MB
4MB	4MB	12MB
14MB	16MB	36MB
64MB**	64MB**	128 MB t

* Standard soldered memory
** Check with your dealer to see if this SIMM is available
t With this memory configuration, the 4MB of soldered memory is disabled-

400183400

EPSON® PROGRESSION™

User's Guide

This manual is printed on recycled paper and is 100% recyclable

FCC COMPLIANCE STATEMENT
FOR AMERICAN USERS

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio and television reception. However, there is no guarantee that interference will not occur in a particular installations If this equipment does cause interference to radio and television reception which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- **Reorient or relocate the receiving antenna**
- **Increase the separation between the equipment and receiver**
- **Connect the equipment into an outlet on a circuit different from that to which the receiver is connected**
- **Consult the dealer or an experienced radio/TV technician for help.**

WARNING

The connection of a non-shielded equipment interface cable to this equipment will invalidate the FCC Certification of this device and may cause interference levels that exceed the limits established by the KC for this equipment. It is the responsibility of the user to obtain and use a shielded equipment interface cable with this device. If this equipment has more than one interface connector, do not leave cables connected to unused interfaces.

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

FOR CANADIAN USERS

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de Classe B prescrites dans le règlement sur le brouillage radioélectrique édicté par le Ministère des Communications du Canada.

IMPORTANT NOTICE
DISCLAIMER OF WARRANTY

Epson America makes no representations or warranties, either express or implied, by or with respect to anything in this manual, and shall not be liable for any implied warranties of merchantability and fitness for a particular purpose or for any indirect, special or consequential damages. Some states do not allow the exclusion of incidental or consequential damages, so this exclusion may not apply to you

COPYRIGHT NOTICE

TRADEMARKS

Epson is a registered trademark and Epson Progression is a trademark of Seiko Epson Corporation.

VirtualCache is a trademark of Epson Portland, Inc.

General notice: Other product names used herein are for identification purposes only and may be trademarks of their respective companies.

Y74599100100

Important Safety Instructions

1. **Read all of these instructions and save them for later reference.**

2. **Follow all warnings and instructions marked on the computer.**

3. **Unplug the computer from the wall outlet before cleaning. Use a damp cloth for cleaning; do not use liquid or aerosol cleaners.**

4. **Do not spill liquid of any kind on the computer.**

5. **Do not place the computer on an unstable cart, stand, or table.**

6. **Slots and openings in the cabinet and the back or bottom are provided for ventilation; do not block or cover these openings. Do not place the computer near or over a radiator or heat register.**

7. **Operate the computer using the type of power source indicated on its label. If you are not sure of the type of power available, consult your dealer or local power company.**

8. **If you plan to operate the computer in Germany, observe the following safety precaution:**

   To provide adequate short-circuit protection and overcurrent protection for this computer, the building installation must be protected by a 16 Amp circuit breaker.

9. **Connect all equipment to properly grounded (earthed) power outlets. If you are unable to insert the plug into an outlet, contact your electrician to replace your outlet. Avoid using outlets on the same circuit as photocopiers or air control systems that regularly switch on and off.**

10. **Do not allow the computer's cord to become damaged or frayed.**

11. **If you use an extension cord with the computer, make sure the total of the ampere ratings of the devices plugged into the extension cord does not exceed the ampere rating for the extension cord. Also, make sure the total of all products plugged into the wall outlet does not exceed 15 amperes.**

12. **Do not insert objects of any kind into this product through the cabinet slots.**

13. **Except as specifically explained in this User's Guide, do not attempt to service the computer yourself. Refer all servicing to qualified service personnel.**

14. **Unplug the computer from the wall outlet and refer servicing to qualified service personal under the following conditions:**

    A. **When the power cord or plug is damaged.**

    B. **If liquid has entered the computer.**

    C. **If the computer does not operate normally when the operating instructions are followed. Adjust only those controls that are covered by the operating instructions. Improper adjustment of other controls may result in damage and often requires extensive work by a qualified technician to restore the computer to normal operation.**

    D. **If the computer has been dropped or the cabinet has been damaged.**

    E. **If the computer exhibits a distinct change in performance.**

Instructions Importantes de Sécurité

1. Lire complètement les instructions qui suivant et les conserver pour références futures.

2. Bien suivre tous les avertissements et les instructions indiqués sur l'ordinateur.

3. Débrancher l'ordinateur de toute sortie murale avant le nettoyage. Utiliser un chiffon humide; ne jamais utiliser un nettoyeur liquide ou une bonbonne aérosol.

4. Ne jamais renverser un liquide d'aucune sorte sur l'ordinateur.

5. Ne pas placer l'ordinateur sur un chariot, un support, ou une table instable.

6. Les évents dans le meubles, à l'arrière et en dessous sont conçus pour l'aération; on ne doit jamais les bloquer. Ne pas placer l'ordinateur près d'une source de chaleur directe.

7. Le fonctionnement de l'ordinateur doit s'effectuer conformément au type de source d'alimentation indiquée sur l'étiquette. Dans le cas d'un doute de la source disponible, on doit communiquer avec le concessionaire ou la compagnie d'électricité.

8. Lorsqu'on désire utiliser l'ordinateur en Allemagne, on doit observer les normes sécuritaires qui suivent:

   Afin d'assurer une protection adéquate à l'ordinateur contre les court-circuits et le survoltage, l'installation de l'édifice doit comprendre un disjoncteur de 16 amp.

9. On doit brancher tout l'équipement dans une sortie reliée à la masse. Lorsqu'il est impossible d'insérer la fiche dans la prise, on doit retenir les services d'un électricien ou remplacer la prise. Ne jamais utiliser une prise sur le même circuit qu'un appareil à photocopie ou un système de contrôle d'aération avec commutation marche-arrêt.

10. S'assurer que le cordon d'alimentation de l'ordinateur n'est pas effrité.

11. Dans le cas où on utilise un cordon de rallonge avec l'ordinateur, on doit s'assurer que la valeur totale d'ampères branchés dans le cordon n'excède en aucun temps les ampères du cordon de rallonge. La quantité totale des appareils branchés dans la prise murale ne doit jamais excéder 15 ampères.

12. Ne jamais insérer un objet de quelque sorte que ce soit dans les cavités de cet appareil.

13. Sauf tel que spécifié dans la notice d'utilisation, on ne doit jamais tenter d'effectuer une réparation de l'ordinateur. On doit référer le service de cet appareil à un technicien qualifié.

14. Débrancher l'ordinateur de la prise murale et confier le service au personnel de service qualifié selon les conditions qui suivent:

    A. Lorsque le cordon d'alimentation ou la prise sont endommagés.

    B. Lorsqu'un liquide s'est infiltré dans l'ordinateur.

    C. Lorsque l'ordinateur refuse de fonctionner normalement même en suivant les instructions. N'ajuster que les commandes qui sont énumérées dans les instructions de fonctionnement. Tout ajustement inadéquat de tout autre contrôle peut provoquer un dommage et souvent nécessiter des réparations élaborées par un technicien qualifié afin de remettre l'appareil en service.

    D. Lorsqu'on a échappé l'ordinateur ou que l'on a endommagé le boîtier.

    E. Lorsque l'ordinateur démontre un changement noté au niveau de sa performance.

Contents

Introduction

Chapter 1 Using Your Computer

Chapter 2 Accessing Internal Components

Chapter 3 Installing and Removing Options

Chapter 4 Installing and Removing Drives

Chapter 5 Running System Diagnostics

Appendix A Specifications

Glossary

Index

Introduction

Your new Epson® Progression™ computer is a very fast, high-performance system offering flexibility and expandability in a compact design. It provides the following features:

- **4MB of internal memory, expandable to 128MB**
- **System and video BIOS shadow RAM**
- **8KB of internal cache**
- **VirtualCache™ -the Epson proprietary memory architecture which allows the system to use all its system memory as a virtual cache pool**
- **Integrated VGA (video graphics array) controller with Wingine™ video technology developed by Chips and Technologies® for Microsoft® Windows™ users**
- **Built-in serial and parallel ports**
- **Built-in IBM® PS/2™ compatible keyboard and mouse ports**
- **Six 16-bit option slots**
- **Support for up to five mass storage drives: two internal and three externally-accessible**
- **Upgradable CPU (central processing unit) card with sockets for a math coprocessor and an Intel® OverDrive™ module**
- **Upgradable video interface daughterboard**
- **Password security**
- **Lockable case.**

Your computer's video and memory features work together to make it extremely fast. The advanced system architecture allows the CPU to communicate directly with the Wingine video controller, providing direct throughput from the system memory to the display. Combined with the speed and graphics capabilities of the Wingine VGA controller, this technology produces screen refresh rates that are ten tunes faster than standard super VGA systems and up to five tunes faster than systems that employ "local bus" technology.

Additionally, your computer can use all of its memory as a virtual cache pool. Unlike most systems that provide only a 64KB or 128KB cache buffer-which typically fills up with the first or second memory access command-your computer uses all the RAM as a "virtual" cache buffer. You'll notice the improved performance especially when running memory-consuming graphics programs such as Windows applications or draw programs.

Using the built-in interfaces, you can connect your peripheral devices directly to the computer so you don't have to install option cards. You can use the option slots to enhance your system with extra functions such as a modem card, network card, or additional interface ports.

Optional Equipment

You can easily upgrade your computer by installing additional memory and a wide variety of options, as described below.

Memory

By adding 1MB, 4MB, 16MB, or 64MB SIMMs (single inline memory modules) to the main system board, you can expand the computer's memory up to 128MB.

Drives

Your system can support up to five mass storage devices, such as hard disk drives, diskette drives, a tape drive, or a CD-ROM drive. As your storage needs expand, you can install these drives to provide the necessary space for all your data.

CPU Card

Because the CPU card is replaceable, you can easily upgrade your system without having to purchase a new computer. The CPU card is available in three models: 486SX/25, 486DX/33, and 486DX2/66. In addition to the system speed and performance enhancements that come with a faster CPU, the Wingine VGA controller speeds up your video performance to match the capability of your CPU card.

OverDrive Module

You can also enhance your system-without replacing the CPU card-by installing an Intel OverDrive module on the CPU card. This doubles the internal clock speed of the microprocessor so your system runs much faster.

Math Coprocessor

You may want to install a math coprocessor to enhance the speed and performance of mathematical calculations in certain application programs. Roth the 486DX/33 and the 486DX2/66 cards have a math coprocessor built into the CPU and also have a socket for an optional Weitek® math coprocessor chip. On the 486SX/25 card you can install an Intel 487SX/25 micro-processor chip, which has a built-in math coprocessor.

Video Daughterboard

While the Wingine super VGA controller is soldered on the computer's main system board, the video interface is supplied on a small, upgradable daughterboard which you can replace with an enhanced daughterboard. The standard board provides resolutions up to 1024 x 768 and the enhanced board supports resolutions up to 1280 x 1024, as well as "true color." The 24-bit, true color technology allows your compatible monitor to display in millions of colors, instead of just 16 or 256.

Check with your authorized Epson dealer for information on optional equipment. For installation instructions, see Chapters 2,3, and 4 of this manual.

VGA Utilities

Your computer comes with special MS-DOS VGA device drivers and utilities for use with the integrated VGA interface. With these utilities, you can take advantage of extended VGA features such as high resolutions and 132-column text mode when you run popular application programs. The Wingine controller works with the display drivers to provide sharp, clear resolutions of up to 1280 x 1024 for the Windows environment. See the *VGA Utilities Guide* **for installation instructions.**

How to Use This Manual

This manual contains the information you need to get the best results from your computer. You don't have to read everything in this book; check the following summary.

Chapter 1 covers general operating procedures, such as turning the computer on and off, using disks and disk drives, entering a password, and changing the processor speed.

Chapter 2 provides instructions for removing and replacing the computer's cover, front panel, and subassembly so you can access components inside the computer.

Chapter 3 describes how to change jumper settings and install optional equipment such as option cards, memory modules, a CPU card, an OverDrive module, a math coprocessor, and a video daughter-board.

Chapter 4 explains how to install and remove disk drives.

Chapter 5 provides instructions for running system diagnostics.

Chapter 6 gives the procedure for formatting a hard disk.

Chapter 7 contains troubleshooting tips.

Appendix A lists the specifications of your computer.

At the end of this manual, you'll find a glossary and an index.

> Note
> **Please see the** *Setup Guide* **for instructions on setting up your system and running the SETUP program.**

Where to Get Help

If you purchased your computer in the United States, Epson America provides local customer support and service through a nationwide network of authorized Epson dealers and Service Centers. Epson also provides the following support services through the Epson Customer Support Center at (800) 922-8911:

- **Technical assistance with the installation, configuration, and operation of Epson products**
- **Assistance in locating your nearest Authorized Epson Reseller or Service Center**
- **Sales of ribbons, supplies, parts, documentation, and accessories for your Epson product**
- **Customer Relations**
- **Epson technical information library fax service-also available directly by calling the toll number (310) 782-4214**
- **Product literature with technical specifications on our current and new products**
- **User group information.**

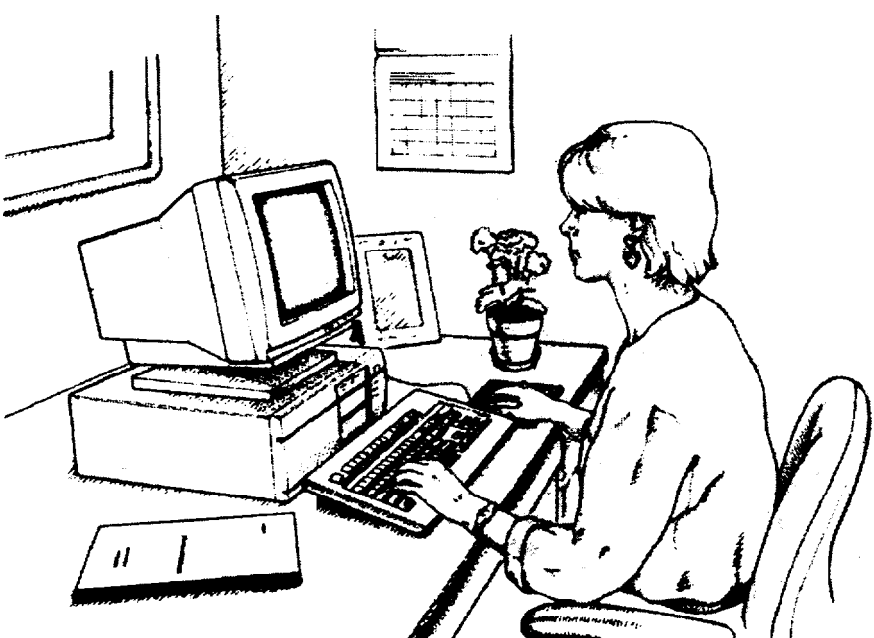
If you purchased your computer outside the United States, please contact your dealer or the marketing location nearest you for customer support and service. International marketing locations are listed on the inside back cover.

If you need help with any software application programs you are using, see the manuals that came with the programs for information about the technical support offered by the manufacturer.

Chapter 1
Using Your Computer

This chapter gives you a brief overview of some basic computer operations that you'll use on a daily basis, such as how to turn your system on and off, use diskettes and disk drives, and reset the computer.

If you are familiar with these aspects of operating a computer, you may want to skip the first few sections of this chapter. However, be sure to read the later sections which describe system operations specific to your computer, such as using a password, changing the processor speed, and preparing the hard disk for moving.



Turning On the Computer

Before turning on your computer, check the following safety rules to avoid accidentally damaging your computer or injuring yourself:

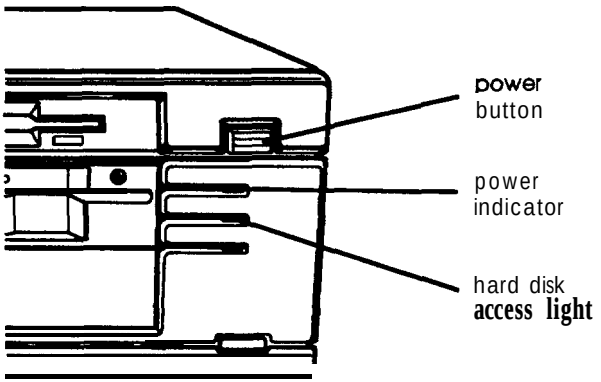
- **Do not connect or disconnect any power cables or peripheral device cables (including the mouse or keyboard) when the computer's power is on.**
- **Never turn on the computer with a protective card in a 5.25-inch diskette drive.**
- **Never turn off or reset your computer while a disk drive light is on. This can destroy data stored on the disk.**
- **Always wait at least 10 seconds after you turn off the power before you turn it on again. This prevents possible damage to the computer's electrical circuitry.**

Follow these steps to turn on your system:

1. **Turn on the monitor, printer, and any other peripheral devices connected to the computer.**
2. **If you do not have a hard disk (or if you have not installed the operating system on the hard disk), insert your main operating system diskette in drive A.**

> Note
> **If you do not have a hard disk, you need to insert the operating system diskette each time you turn on your system so the computer can copy the operating system to its memory. See your operating system manual for more information.**

3. **To turn on the computer, press the power button located on the right side of the front panel, as shown below.**



The power indicator below the button lights up. After a few seconds, the computer displays a count of its system memory, and then performs its power-on diagnostics. This is a series of checks the computer runs each time you turn it on to make sure everything is working correctly. (If necessary, use the controls on your monitor to adjust the screen display.)

> Note
> **If you or your dealer has made a major change to your system, such as adding a disk drive, you may need to wait a few minutes for your computer to complete power-on diagnostics the first time you turn it on.**

When the system has successfully completed its diagnostics, you see the following prompt:

```
Press <F2> to run SETUP
```

Note

If your computer's configuration does not match the information stored in the computer's CMOS RAM (defined through the SETUP program), you see an error message and a prompt to press the F2 key. Press F2 to run the SETUP program to correct the information. (See Chapter 2 of the *Setup Guide* for instructions.)

If you do not want to run SETUP, ignore the prompt. Your computer then loads the operating system from the hard disk or the diskette in drive A. (If the operating system has not been installed on the hard disk or is not on the diskette you inserted, the computer displays an error message. See your operating system manuals for installation instructions.)

What happens next depends on how your computer is set up. If it is configured to automatically load a program (such as Windows or a word processing program), you see the first menu or screen display of that program. If not, you may see the operating system prompt, such as C:\> or A>. See your application program manuals for further instructions.

Turning Off the Computer

Whenever you turn off your system, follow these steps:

1. **Save your data and exit any program you are using.**

2. **Check the hard disk access light and the diskette drive light(s) to make sure they are not on. (See the illustration on page 1-3 to locate these lights.) Do not turn off the computer if a drive light is on, because you can damage the drive or lose data.**

3. **Remove any diskette(s) from the diskette drive(s).**

4. **Press the power button to turn off the computer and then turn off any peripheral devices (monitor, printer, etc.).**

> **Caution**
> **If you need to move your computer, always wait at least *20* seconds after turning it off before you move it. This allows your hard disk drive's read/write heads to move away from the disk to a safe location. If you move your computer before this happens, you could damage your hard disk drives.**

Using Disks and Disk Drives

The disk drives in your computer allow you to store data on disk, and then retrieve and use your stored data. This section explains how disks work and tells you how to:

- **Use different types of diskettes and diskette drives**
- **Care for your diskettes and diskette drives**
- **Write-protect diskettes**
- **Insert and remove diskettes**
- **Use a single diskette drive system**
- **Format diskettes**
- **Make backup copies**
- **Use a hard disk drive.**

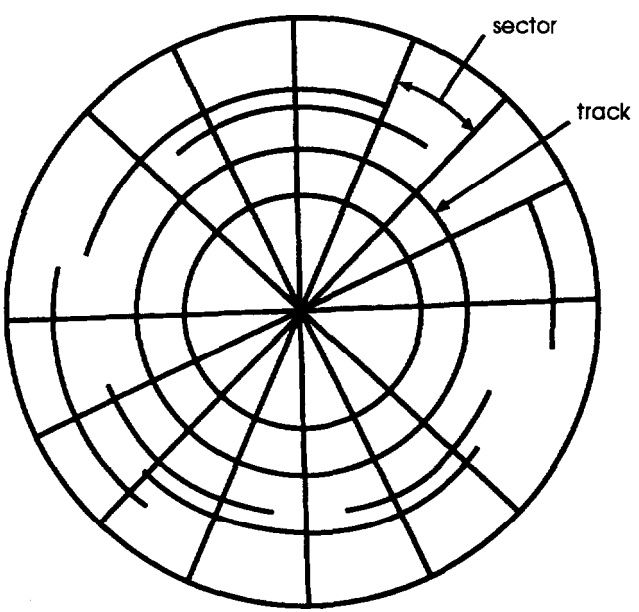
How Disks Store Data

Diskettes are made of flexible plastic coated with magnetic material. This plastic is enclosed in a square jacket that is either slightly flexible (5.25-inch diskette) or hard (3.5-inch diskette).

Unlike a diskette, a hard disk is rigid and fixed in place. It is sealed in a protective case to keep it free of dust and dirt. A hard disk stores data the same way that a diskette does, but it works much faster and has a much larger storage capacity.

All disks are divided into data storage compartments by sides, tracks, and sectors. Double-sided diskettes store data on both sides. On each side are concentric rings, called tracks, on which a disk can store data.

A disk is further divided by sectors, which can be visualized as pie slices. The illustration below provides a simple representation of tracks and sectors.



Double-sided, double-density diskettes have either 40 or 80 tracks on each side, and double-sided, high-density diskettes have 80 tracks on each side. Diskettes can have 8,9,15, or 18 sectors per track.

A hard disk consists of two or more platters stacked on top of one another and thus has four or more sides. In addition, a hard disk has many more tracks per side than a diskette, but the number of tracks depends on the capacity of the hard disk. The number of sectors depends on the type of hard disk.

Your computer uses the read/write heads in a disk drive to store and retrieve data on a disk. To write to a disk, the computer spins it to the position under the read/write head where the data is to be written. A diskette has an exposed area where the read/write head can access it.

Because data is stored magnetically, you can retrieve it, record over it, and erase it just as you play, record, and erase music on a cassette tape.

Types of Diskette Drives

The following list describes the four types of diskette drives you can use in your computer and which diskettes to use with them:

- **l.44MB drive-use 3.5-inch, double-sided, high-density, 135 TPI (tracks per inch), l.44MB diskettes. These diskettes contain 80 tracks per side, 18 sectors per track, and hold up to 1.44MB of information (approximately 600 pages of text).**

> Note
> **MB stands for megabyte, which equals 1024KB (or 1,048,576 bytes). KB stands for kilobyte, which equals 1024 bytes. Each byte represents a single character, such as A, $, or 3.**

- **1.2MB drive-Use 5.25-inch, double-sided, high-density, 96 TPI, 1.2MB diskettes. These diskettes contain 80 tracks per side, 15 sectors per track, and hold up to 1.2MB of information (approximately 500 pages of text).**

- **720KB drive-Use 3.5-inch, double-sided, double-density, 135 TPI, 720KB diskettes. These diskettes contain 80 tracks per side, 9 sectors per track, and hold up to 720KB of information (approximately 300 pages of text).**

- **360KB drive-use 5.25-inch, double-sided, double-density, 48 TPI, 360KB diskettes. (You can also use single-sided, 160KB or 180KB diskettes.) These diskettes contain 40 tracks per side and 8 or 9 sectors per track. With 8 sectors per track, a diskette holds up to 320KB. With 9 sectors per track, a diskette holds up to 360KB of information (approximately 150 pages of text).**

> *Note*
> *You* **must format a new diskette before you can store data on it. See "Formatting Diskettes," later in this section.**

Drive and diskette incompatibilities

If your computer has more than one type of diskette drive, or if you use different types of diskettes, you need to be aware of certain incompatibilities between the drives and diskettes.

Because of the type and size differences, you cannot use a 3.5-inch diskette in a 5.25-inch drive or vice versa. There are also limitations on using diskettes that are the same size as the drive but have different capacities. The following tables summarize the possibilities and limitations.

5.25-inch drive/diskette compatibility

Drive type	Diskette types it can read from and write to
360KB	360KB, 320KB, 180KB, 160KB
1.2MB	1.2MB, 36OKB,* 32OKB,* 18OKB,* 160KB*

* If you write to this diskette in a 1.2MB drive, you may not be able to read it or write to it In a 360KB drive later.

3.5-inch drive/diskette compatibility

Drive type	Diskette types it can read from and write to
720KB	720KB
1.44MB	1.44MB, 720KB

Because of possible incompatibilities, always indicate the diskette type and density when you label your diskettes. (Usually this information appears on the manufacturer's label.)

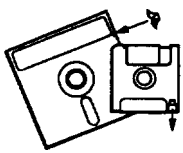
Note
If you want to format a 720KB diskette in a 1.44MB drive or format a 360KB diskette in a 1.2MB drive, make sure you include the correct parameter in your format command. See your operating system manuals for instructions.

If you have any combination of the above drives (1.44MB, 1.2MB, 720KB, or 360KB) and you are using MS-DOS, you can copy files from one drive to another-using COPY or XCOPY -as long as the correct diskette type is in each drive. You can also use these commands to copy files between a hard disk and any type of diskette. However, you cannot use the MS-DOS DISKCOPY command to copy from one diskette drive to another if the two drives are not the same type. For more about copying files and diskettes, see your MS-DOS or other operating system manuals.

Caring for Diskettes and Diskette Drives

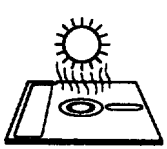
Follow these basic precautions to protect your diskettes and avoid losing data:

- **Remove all diskettes before you turn off the computer.**



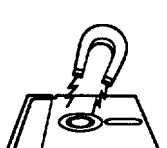
If you have a diskette that contains data you don't want to accidentally write over or erase, be sure you write-protect it. This is especially important for your operating system and application program diskettes. See 'Write-protecting Diskettes," below, for more details.

- **Do not remove a diskette from the diskette drive or reset or turn off the computer while the drive light is on. This light indicates that the computer is copying data to or from a diskette. If you interrupt this process, you can destroy data.**



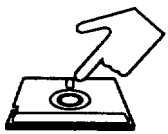
Keep diskettes in a moderate environment. Don't leave them sitting in the sun or in extreme cold or heat because this can destroy the data.

- **Keep diskettes away from dust and dirt. Small particles of dust or dirt can scratch the magnetic surface, destroy data, and ruin the read/write heads in a diskette drive.**



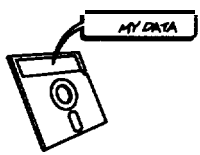
Keep diskettes away from magnetic fields, such as those generated by electrical appliances, telephones, and loudspeakers. (Diskettes store information magnetically.)

- **Do not place diskettes on top of your monitor or near an external hard disk drive.**



Always hold a 5.25-inch diskette by its protective jacket and never touch the magnetic surface (exposed by the read/write slot). The oils on your fingertips can damage it.

- **Never wipe, brush, or try to clean diskettes in any way.**



Write on a diskette label before you attach it to the diskette. If you need to write on a label that is already on the diskette, use only a soft-tip pen-not a ballpoint pen or a pencil.

- **Carefully label your diskettes and indicate the type and density. Do not stick several labels on top of one another; this can make it difficult to insert and remove the diskette in the drive.**

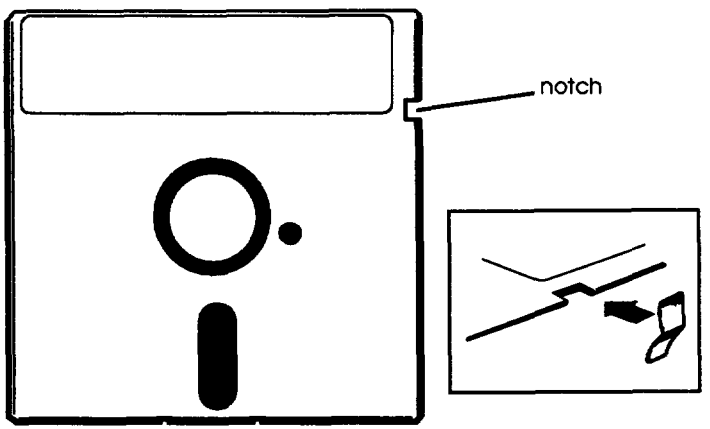
Store diskettes in their protective envelopes and in a proper location, such as a diskette container. Do not store diskettes flat or stack them on top of each other.

- **Do not place anything on top of your diskettes, and be sure they do not get bent.**

Write-protecting Diskettes

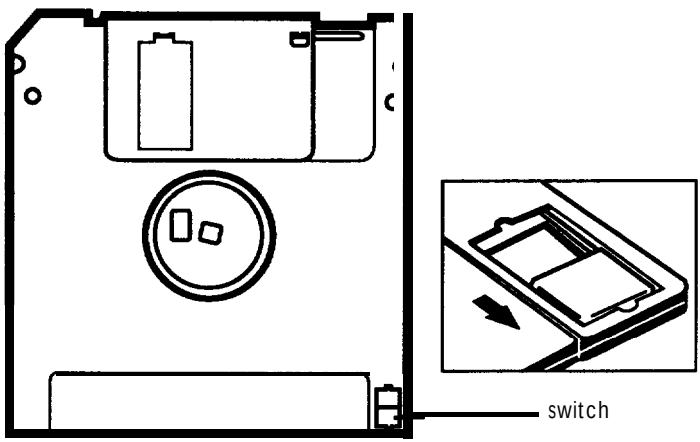
You can write-protect a diskette to prevent its data from being altered. When a diskette is write-protected, you can read it and copy data from it, but you cannot store new data on it or delete any files it contains.

To write-protect a 5.25-inch diskette, cover the small, rectangular notch (shown below) with an adhesive write-protect tab. Write-protect tabs usually are included in a new package of blank 5.25-inch diskettes.



To remove the write protection, peel off the write-protect tab.

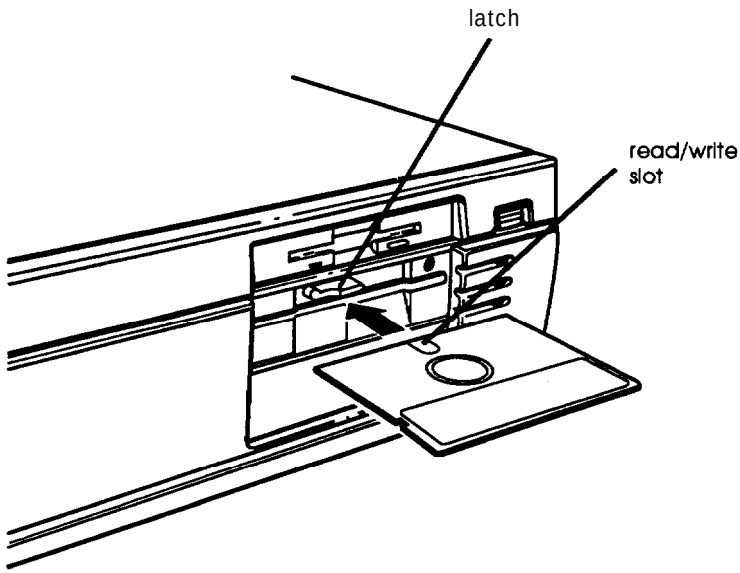
On a 3.5-inch diskette, the write-protect device is a small switch on the back of the diskette in the lower right comer, shown below. To write-protect a 3.5-inch diskette, slide the switch toward the edge of the diskette until it clicks into position, exposing a hole in the comer.



To remove the write protection, slide the switch toward the center of the diskette until it clicks into position and the hole is covered.

Note
Some program diskettes have no notch or switch so they are permanently write-protected. This protects them from being accidentally erased or altered.

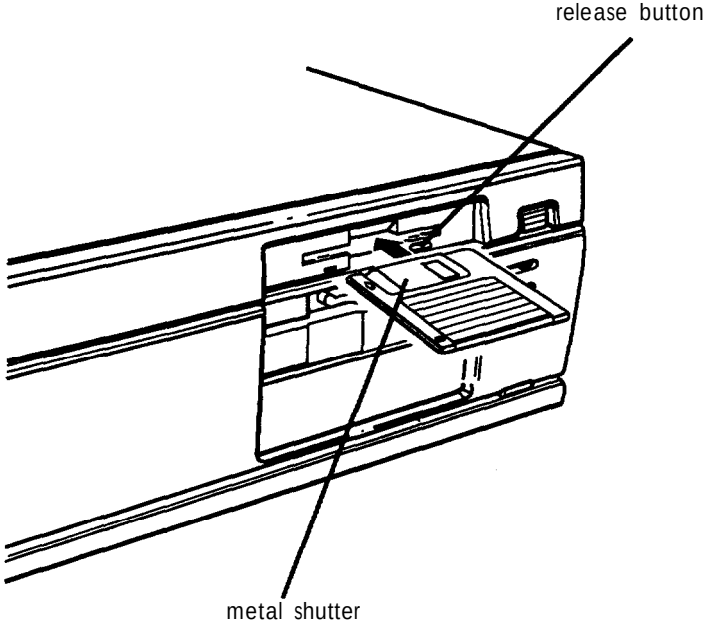
If you have a 5.25-inch diskette drive, insert a diskette as follows: hold the diskette with the label facing up and the read/write slot leading into the drive, as shown below.



Slide the diskette all the way into the slot. Then turn the latch down to lock it in a vertical position. This keeps the diskette in place and enables the read/write heads in the drive to access the diskette.

When you want to remove a diskette, first make sure the disk drive light is off. Then flip up the latch and carefully pull out the diskette. Place it in its protective envelope and store it in a proper location, such as a diskette container.

If you have a 3.5-inch diskette drive, insert the diskette with the label facing up and the metal shutter leading into the drive, as shown below. Slide the diskette into the drive until it clicks into place.



When you want to remove the diskette, make sure the drive light is off; then press the release button. When the diskette pops out, remove it and store it properly.

Caution

Never remove a diskette, or reset or turn off the computer while a diskette drive light is on. You could lose data. Also, remove all diskettes before you turn off the computer.

Using a Single Diskette Drive System

Most operating systems expect the computer to have at least two diskette drives and display prompts and messages accordingly. MS-DOS, for example, recognizes the first diskette drive (the top drive) as drive A and a second diskette drive as drive B. If you have only one diskette drive, MS-DOS can treat it as both A and B when you need to perform operations that normally would use two diskette drives.

For example, if you enter a command to copy data from A to B, MS-DOS copies the data from the first diskette you place in the drive (which would be drive A) to the computer's memory. Then MS-DOS prompts you to insert another diskette (for drive B) and copies the data from memory to the new diskette. When copying is complete, you see a prompt to insert the original diskette (A).

Because you may often swap diskettes this way, it is important to remember which diskette is which. It is also a good idea to write-protect your original diskette. (See 'Write-protecting Diskettes," above.)

If you have a hard disk and one diskette drive, you can load the operating system and application programs from the hard disk, create and store your data there, and use the diskette drive just for copying data to or from diskettes.

However, if you have only one diskette drive and no hard disk, you need to use that drive to load the operating system as well as any application program you are using. First, insert the operating system diskette (the MS-DOS Startup diskette, for example) in drive A and load the operating system; this copies it to the computer's memory (RAM) so you do not need to leave the system diskette in the drive. Then remove the system diskette and insert your application program diskette to load that data into memory, too. See your application program manual for detailed instructions.

Formatting Diskettes

Before you can store data on a new diskette, you must format it. Formatting prepares the diskette so that the operating system can write data on it. You need to do this only once, before you use the diskette for the first time.

You can also reformat previously used diskettes to store new data. This process erases all the data on the diskette, so be sure you do not want to save any of the files on a used diskette before you format it. See your operating system manuals for instructions on formatting diskettes.

Making Backup Copies

It is important to make copies of all your data and system diskettes. Make backup (or working) copies of all diskettes that contain programs, such as your operating system, Reference, and Utility diskettes; then use only the copies. Store the original diskettes away from your working diskettes. Also, copy your data diskettes regularly, whenever you revise them, and store them away from your originals.

If you have a hard disk, you'll probably use it to store the programs and data files you use regularly. Keep backup copies of all your files on diskettes or tapes (if you have a tape backup drive).

Using a hard disk is similar to using a diskette. However, the hard disk provides several advantages:

- **A 240MB hard disk can store as much data as approximately 198 1.2MB diskettes or 165 1.44MB diskettes.**
- **Your computer can perform all disk-related operations faster.**
- **You can store frequently used programs and data files on the hard disk, eliminating the inconvenience of swapping diskettes to access different files.**

The added storage capacity makes it easy to move back and forth between different programs and data files. However, because it is so easy to add programs and files to your hard disk, you may find yourself trying to organize hundreds of files.

Most operating systems let you keep related files together in directories and subdirectories so they are easy to find and use. See your operating system manuals for instructions on managing your files and directories.

> Note
> **A hard disk must be partitioned and formatted before you can use it. Be sure you have performed the procedures described in your operating system manuals to prepare your hard disk for use.**

Backing up the hard disk

While the hard disk is very reliable, it is essential to back up your hard disk files to diskettes or tapes in case you lose some data accidentally. Make copies of all your system and application program diskettes before copying the programs to the hard disk. After you create data files on the hard disk, be sure to back them up whenever you revise them to keep your backup diskettes or tapes up-to-date.

caring for your hard disk

Follow these precautions to protect your hard disk drive from damage and to avoid losing data:

- **Never turn off or reset the computer when the hard disk access light is on. This light indicates that the computer is copying data to or from the hard disk. If you interrupt this process, you can lose data. (See the illustration on page 1-3 to locate the hard disk access light.)**

- **Never attempt to open the hard disk drive. The disk itself is enclosed in a sealed container to protect it from dust.**

- **If you need to move your computer, you may need to run the HDSIT program to prepare the hard disk for moving, as described on page 1-36.**

Special Keys *on the Keyboard*

Certain keys on your keyboard serve special functions when your computer is running your operating system or application programs, as described in the table below.

Special key functions

Key	Purpose
Tab ⇤⇥	Moves the cursor one tab to the right In normal mode and one tab to the left in Shift mode.
Caps Lock	Changes the letter keys from lower- to uppercase; changes back to lowercase when pressed again. The numeric/symbol keys on the top row of the keyboard and the symbol keys in the main part of the keyboard are not affected.
Shift	Produces uppercase characters or the top symbols on the keys when used with the main character keys. Produces lowercase characters when the Caps Lock function is on.
Ctrl	Works with other keys to perform special (control) functions.
Alt	Works with other keys to enter alternate character codes or functions.
← Backspace	Moves the cursor back one space, deleting the character to the left of the cursor.
Enter	Ends a line of keyboard input or executes a command.
Insert	Turns the insert function on and off.
Delete	Deletes the character marked by the cursor.
Home, End, Pg Up, Pg Dn, ↑, ←, ↓, →	Control cursor location.
Esc	Cancels the current command line or operation.

Special key functions (continued)

Key	Purpose
Num Lock	Changes the function of the numeric/cursor keys from entering numbers to positioning the cursor.
F1 - F12	Perform special functions within application programs.
Print Screen	Prints the screen display on a printer.
Sys Req	Generates the System Request function in some application programs (used with Alt).
Scroll Lock	Controls scrolling in some applications.
Pause	Suspends the current operation.
Break	Stops the current operation (used with Ctrl).

The Caps Lock, Num Lock, and Scroll Lock keys work as toggles; press the key once to turn on a function and again to turn it off. When the function is enabled, the corresponding light in the upper right comer of the keyboard is lit.

Stopping a Command or Program

You may sometimes need to stop a command or program while it is running. If you have entered an MS-DOS or application program command that you want to stop, try one of the following:

- **Hold down Ctrl and press C**
- **Hold down Ctrl and** press **Break**.

If these methods do not work, you may need to reset the computer as described below. Do not turn off the computer to exit a program or stop a command unless you have to, because the computer erases any data you did not save.

Resetting the Computer

Occasionally, you may want to clear the computer's current settings or its memory without turning it off. You can do this by resetting the computer.

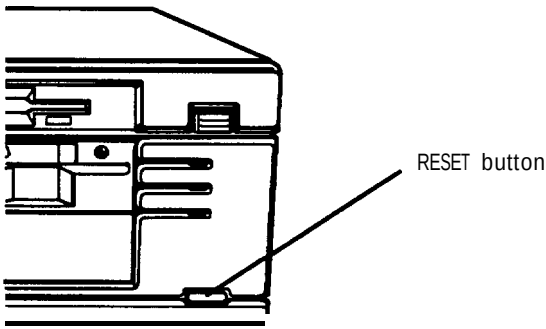
For example, if an error occurs and the computer does not respond to your keyboard entries, you can reset it to reload your operating system and try again. However, resetting erases any data in memory that you have not saved; so reset only if necessary.

> Caution
> **Do not reset the computer as a means to exit a program. Some programs classify and store new data when you exit them in the normal manner. If you reset the computer without properly exiting a program, you may lose data.**

To reset the computer, the operating system must be either on the hard disk or on a diskette in drive A; so if you do not have a hard disk, insert a system diskette in drive A.

There are two ways to reset the computer:

- **If you are using MS-DOS, hold down Ctrl and Alt and press Delete. The screen goes blank for a moment and then the computer should reload your operating system.**
- **Press the RESET button on the front panel (shown in the following illustration); this method works even when the computer does not respond to your keyboard entries.**



If resetting the computer does not correct the problem, you probably need to turn it off and on again to reboot it. Remove any diskette(s) from the diskette drive(s). Turn off the computer and wait 10 seconds. If you do not have a hard disk, insert a system diskette in drive A. Then turn on the computer.

locking the Computer's Cover

You can lock the cover onto the computer to prevent unauthorized users from accessing its internal components.

To lock the cover, insert the key as shown on the left and turn it clockwise. To unlock the cover, insert the key as shown on the right and turn it counterclockwise.

Using a Password

If you set a password when you ran the SETUP program, you must enter it every time you turn on or reset the computer. Follow these steps to use your password:

1. **If you do not have a hard disk, insert your system diskette in drive A.**

2. **Turn on or reset the computer. You see a number and the key prompt:**

3. **Type your password. The key turns when you type a character, but the screen does not display the characters you type. Then press Enter.**

You have three chances to enter the correct password. The number that appears before the key prompt indicates how many tries you have left. After the third incorrect try, the screen displays a zero, the keyboard locks up, and you cannot use the computer. Press the RESET button and try to enter the correct password again.

> Note
> **If you do not know the correct password, see "Password Problems" in Chapter 7.**

After you type the password correctly and press Enter, a happy face character appears. Then the computer loads the operating system and displays the command prompt.

> **Note**
> **If you turned on network server mode when you ran the SETUP program, you need to use a different procedure to enter your password. See "Using Your Computer as a Network Server" on page 1-27.**

Changing a Password

To change your password, follow these steps:

1. **If you do not have a hard disk, insert your system diskette in drive A.**

2. **Turn on or reset the computer. At the key prompt, enter your current password followed by a forward slash (/) and the new one you want to use. For example, if your current password is 123 and you want to change it to ABC, type:**

   ```
   123/ABC
   ```

   The screen does not display what you type.

   Do not use characters requiring the Shift key, such as %, @, or #, in your new password. The computer does not distinguish between characters that are produced with the Shift key and those that are not.

   > **Caution**
   > Be sure to remember the new password you enter, or you will not be able to access your computer the next time you turn it on.

3. **Press Enter. A happy face character appears and then the computer loads the operating system.**

> Note
> **You can also change your password using the SETUP program. See Chapter 2 of the Setup Guide for instructions.**

Deleting a Password

To delete your password, follow these steps:

1. **If you do not have a hard disk, insert your system diskette in drive A.**

2. **Turn on or reset the computer. At the key prompt, enter your current password followed by a forward slash. For example, if your password is 123, type:**

   ```
   123/
   ```

3. **Press Enter. A happy face character appears and then the computer loads the operating system.**

The next time you turn on or reset the computer, it does not request a password and loads the operating system immediately.

> Note
> **You can also delete your password using the SETUP program. See Chapter 2 of the *Setup Guide* for instructions. If you do not know the password, see "Password Problems" in Chapter 7.**

Using Your Computer as a Network Server

A network server is the master computer in a network and provides storage space for the other computers connected to it. It can also write files to and read files from the other computers, making it the most powerful computer in the network.

Even if no one is typing commands at the network server keyboard, the server can process commands sent to it from other computers. If you use your computer as the network server, you may want to prevent unauthorized users from entering commands at the keyboard. To provide this security, you can enable a password in network server mode using the SETUP program.

If you set a password but did not turn on network server mode, you enter the password *before* the computer loads the operating system or the network software. Once you load it, anyone can access your system by typing commands on the keyboard. However, if you set a password and turn on network server mode, you can load your operating system or network software before you enter the password. This allows other computers in the network to access the system, but prevents unauthorized users from entering commands at your keyboard and using any network server access privileges.

When you boot the computer in network server mode, you do not see the key prompt (🔑), as you would if network server mode was turned off. The password prompt is hidden to prevent unauthorized users from knowing that a password is required.

You do not have to set a password in network server mode to use your computer as a network server, but it is helpful. See "Setting the Password Options" in Chapter 2 of the *Setup Guide* for instructions on setting the password and enabling network server mode. Then read the next section to use your network password.

Using a Password in Network Server Mode

When you turn on or reset the computer, it loads your operating system or network software from your hard disk and you see either the command prompt or the first screen displayed by your network software.

> Note
> **If you boot your computer from a diskette in drive A, however, you see the password key prompt before the computer loads your operating system or network software. Follow the instructions in "Using a Password" on page 1-24 to enter your password in this situation.**

Follow these steps to enter your password:

1. **Turn on or reset your computer. You do not see the key prompt (⚷) even though the computer is now waiting for you to enter the correct password.**

2. **Type your password and press Enter. The screen does not display what you type.**

Now you should be able to use your computer. Press a key such as Enter to see if the keyboard accepts your command. If you entered an incorrect password, the computer does not respond. Type the correct password, press Enter, and try using the computer again.

Note
You cannot change or delete your network server mode password as you enter it to access your computer. You must run SETUP to change or delete it. See Chapter 2 of the *Setup Guide* for instructions.

Changing *the Processor Speed*

Your computer's processor can operate at two speeds: high or low. High speed is the highest speed at which your microprocessor is capable of running, such as 33 MHz. Low speed simulates an 8 MHz processor to provide compatibility with older application programs.

You can also set the computer to automatic speed which switches your computer's processor from high to low speed when it accesses a diskette drive.

Note
When your computer is operating at high speed, the TURBO **light on the** front **panel is lit. It is off when the computer is operating at low speed.**

You should use high speed for almost everything you do because your programs will work faster. However, certain application programs have specific timing requirements and can run only at the slower speed. See your software manual to determine if this is the case.

Some copy-protected programs require the computer to run at low speed while accessing the program on a diskette. These programs also usually require you to leave a *key* disk-the diskette that contains the copy protection-in the diskette drive. If you use a copy-protected program often, you may want to set your processor speed to change automatically to low speed when accessing the diskette and return to high speed when it is finished.

Depending on the type of copy-protected program you have, you may or may not want to set the processor to automatic speed. Follow these guidelines:

- **If you are using a copy-protected program that can run only on a diskette or that requires a key disk, try to load the program at high speed. If this works, you do not need to set the speed to change automatically. If you can't load the program on high, set the speed to change automatically.**

- **If you are using a copy-protected program that does not require a key disk but requires a special procedure to install it on a hard disk, set the speed to low while you are installing the program. Then set the speed to high while you load and run the program.**

  If this does not work, try installing and loading the program at low speed and then change to high speed to run it. Do not set the speed to change automatically.

There are three ways to change the processor speed:

- **Run the SETUP program**

- **Enter a keyboard command**

- **Run the ESPEED program.**

If you frequently use programs that require low or automatic speed, use SETUP to change the processor speed. Your new setting remains in effect until you change it again using SETUP. See Chapter 2 of the *Setup Guide* for instructions.

If you use these programs only occasionally, you should use the keyboard commands or the ESPEED program (described below) to change the processor speed. These methods temporarily override the SETUP processor speed setting.

Entering Keyboard Commands

You can change the processor speed temporarily by entering a command from your keyboard. You can use these commands only if you have enabled the Software speed change option in the SETUP program. (Enabled is the default setting.) If this option is disabled, you cannot use the keyboard commands. The keyboard speed setting commands are listed in the table below.

Speed setting commands

Numeric keypad commands	Speed setting
Ctrl Alt +	High
Ctrl Alt *	Automatic (high speed: low speed only during diskette access)
Ctrl Alt -	Low (simulated 8 MHz)

To enter these commands, hold down the Ctrl key and the Alt key simultaneously and then press the +, -, or * key on the numeric keypad.

Note

You can use the commands listed above while you are running a program. However, if the program uses one of these commands for another function, you cannot use it to change the processor speed. For example, if you are running a program that uses the Ctrl Alt – command to move the cursor, you cannot enter Ctrl Alt – to change the processor speed to low. Another alternative is to use the ESPEED program, described below.

The speed setting remains in effect until you do the following:

- **Press Ctrl Alt Delete or the RESET button**
- **Turn off the computer**
- **Change it using the SETUP program**
- **Change it with another keyboard command**
- **Change it using ESPEED.**

Using the ESPEED Program

ESPEED provides an easy way to change the processor speed if your application program does not recognize the Ctrl key commands or if you want to include the program command in a batch file.

The ESPEED program is on the Reference diskette. If you have a hard disk drive, copy the file ESPEED,EXE from your Reference diskette onto your hard disk and run the program from there. If you do not have a hard disk, insert your Reference diskette in drive A and log onto drive A before you enter the command to start the program.

To run SPEED, type the following at the MS-DOS command prompt and press Enter:

```
ESPEED
```

You see the following messages:

```
Usage: ESPEED[/H][/L][/A]
  /High    set High speed (no Auto)
  /Low     set Low speed (no Auto)
  /Auto    set Auto speed
```

These messages tell you the switches you should use to set the speed to high, low, or automatic. At the MS-DOS prompt, type the ESPEED command again and include the appropriate switch, such as the following:

```
ESPEED /A
```

(This command sets the processor speed to change to low speed automatically when the computer accesses a diskette.)

If you include the switch when you type the initial ESPEED command, the program changes the speed without displaying the command options.

The processor speed you set remains in effect until you change it again or until you turn off the computer or reset it with Ctrl Alt Delete or the RESET button.

Entering the ESPEED command in a batch file

You may want to run the ESPEED program by including the command in a batch file. For example, let's say you have a program called SLOWDOWN which requires a slower processor speed. You could include the following commands in a batch file to start the SLOWDOWN program:

```
ESPEED /A
SLOWDOWN
```

You could name the batch file SLOW.BAT. Whenever you need to run the SLOWDOWN program, type SLOW and press Enter. The computer changes the processor speed to automatic and starts the program.

Changing the Speaker Volume

Your computer contains a built-in speaker that beeps when you perform certain operations. You can control the operation and volume of this speaker using the SETUP program and the SETVOL utility, described below.

To enable or disable your speaker, run the SETUP program and change the setting of the Speaker option, as described in Chapter 2 of the *Setup Guide.* **(The default setting of the Speaker option is Enabled.)**

If your speaker is enabled, you can run the SETVOL utility to adjust the volume of the speaker as desired. The file SETVOL.EXE is on the Reference diskette. You may want to copy it to your hard disk for convenience.

Follow these steps to run SETVOL:

1. If you copied SETVOL.EXE to your hard disk, log onto the directory where it is stored.

   If you did not copy the file, insert the Reference diskette in drive A and log onto that drive.

2. At the command prompt, type the following and press Enter:

   ```
   SETVOL
   ```

3. You see the volume selection menu. The VOLUME box at the top of the screen shows the percentage of volume currently set for your speaker, such as 50%. The solid bar in the middle of the screen graphically displays the volume setting as you increase or decrease it.

   To decrease the volume, press ←, ↓, or −. To increase the volume, press →, ↑, or +. (You can use the keys on the main keyboard or the numeric keypad.)

   As you change the volume, the speaker beeps so you can test the volume of the current setting.

4. After you have selected the volume you want, press Enter to store the current setting and exit SETVOL. You see a message confirming the volume setting you selected.

   If you want to exit the program without saving the new setting, press Esc. You see the operating system command prompt.

The speaker volume you set remains in effect until you change it again.

Another way to run SETVOL is to enter the command with a parameter at the command line. The following table lists the parameters available.

SETVOL parameters

Parameter	Function
/?	Displays help information describing the SETVOL command and options
Innn	Specifies a numeric percentage (from 0% to 100%) for the volume
/v	Displays the numeric percentage of the current volume setting

Just type SETVOL followed by the parameter. For example, to set the speaker to 50% of the maximum volume, type the following and press Enter:

```
SETVOL /50
```

Be sure to include the slash (/) in the parameter.

Preparing the Hard Disk for Moving

If you need to move your computer to a new location, you may want to run the HDSIT program provided on your Reference diskette to protect the hard disk during the move.

HDSIT moves (or parks) the disk drive's read/write heads to a region on the disk surface that does not contain data, and locks them securely in position. This protects the hard disk from being damaged if the computer is bumped accidentally.

Many hard disk drives, including all Epson drives, automatically park their heads when you turn off the computer. If your hard disk drive does not do this, or if you are not sure that it does, be sure to run HDSIT.

If you have not already done so, copy the HDSIT.COM and HDSIT.VER files from the Reference diskette to your hard disk. Then, when you want to run HDSIT, log onto the directory where these files are stored. Type HDSIT and press Enter.

You see a message on the screen that tells you the disk drive's read/write heads will remain locked until you reset the computer or turn the power off and on again. The computer then locks the heads and disables the keyboard. Remove any diskettes and turn off the computer. Now you can move it to the new location.

> **Caution**
> Whether you use HDSIT or not, always turn off your computer and wait at least 20 seconds before you move it. This allows your hard disk drive's read/write heads to move away from the disk to a safe location. If you move your computer before this happens, you could damage your hard disk drives.

Using AUTOEXEC.BAT and Other Batch Files

If you are using MS-DOS to access your application programs, you may find that there are commands you need to run frequently. You can automate the execution of these commands by listing them in a special file called a batch file. When you type the name of the batch file and press Enter, MS-DOS executes the commands in the file just as if you had typed each command from the keyboard.

If you have a word processing program that can save a file as a text only file (sometimes called an ASCII file), you can use it to create a batch file. You can also use the MS-DOS COPY, EDIT, or EDLIN command, or a text editor, to create the file.

One batch file that you may find particularly useful is called AUTOEXEC.BAT. Every time you turn on your computer, MS-DOS looks for the AUTOEXEC.BAT file and automatically executes each of the commands in the file.

When you install MS-DOS, it creates an AUTOEXEC.BAT file for you, which you can modify or replace as described above. Be sure to name the file AUTOEXEC.BAT and store it in the root directory of the hard disk or diskette from which you load MS-DOS (You may want to rename your original file to AUTOEXEC.OLD, in case you need to use it again later.)

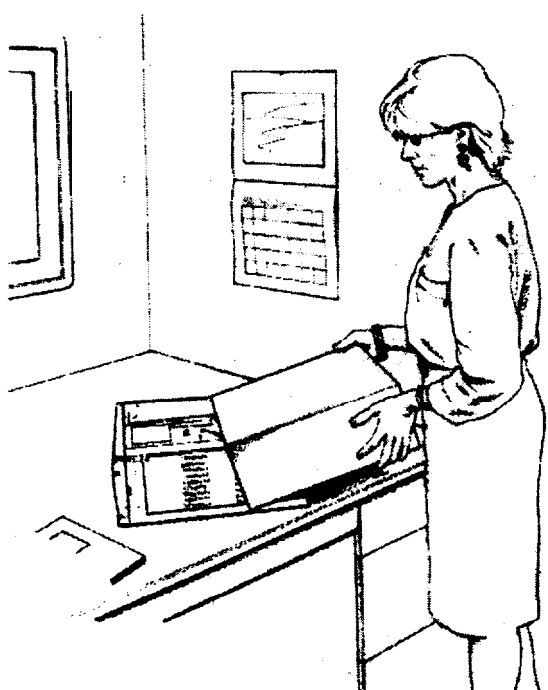
See your MS-DOS manuals for more information about creating and using batch files.

Chapter 2
Accessing Internal Components

To access your computer's internal components, you need to remove the cover. In some cases, you may also need to remove the front panel and the subassembly (the metal case that holds the drive bays). The instructions in this chapter explain how to do the following:

- **Remove and replace the cover**
- **Remove and replace the front panel**
- **Remove and replace the subassembly.**

Read the safety precautions on the next page before you begin.



Special Precautions

As you perform the procedures described in this chapter and in Chapters 3 and 4, observe the following precautions to avoid damaging your equipment or injuring yourself:

- **Do not attempt a procedure if you have any reservations about performing it; ask your dealer for assistance.**
- **Always turn off the computer, disconnect all cables, and wait at least 30 seconds before you remove the cover. First disconnect the power cord from the electrical outlet and from the computer's back panel. Then disconnect all peripheral devices from the computer.**
- **Every time you remove the cover, ground yourself by touching the metal inside of the computer's back panel before you touch any components inside. If you are not properly grounded, you could conduct static electricity and damage your equipment.**
- **When disconnecting a cable from any internal device (such as a disk drive), avoid pulling on the cable; grasp the plastic connector to remove it from the socket.**
- **When plugging a connector or a component into a socket, be sure to position it correctly. Carefully align any connector pins with the corresponding holes in the socket before you push in the connector. Otherwise, you can severely damage the equipment.**
- **If you install an option, keep its original packaging in case you need to remove or transport it later.**
- **Always replace the computer's cover before you turn on the power, or the computer may overheat.**

Removing the Cover

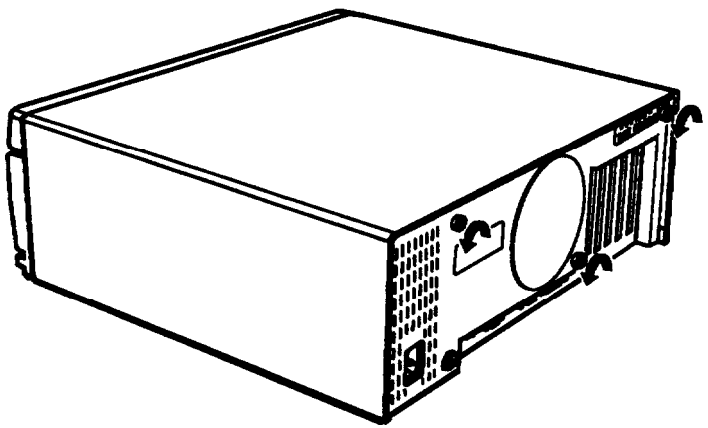
Remove the computer's cover to do any of the following:

- ❑ **Change jumper settings**
- ❑ **Install or remove option cards**
- ❑ **Install or remove single inline memory modules (SIMMs)**
- ❑ **Install or remove a CPU card**
- ❑ **Install or remove a math coprocessor**
- ❑ **Install or remove an OverDrive module**
- ❑ **Install or remove the video daughterboard**
- ❑ **Install or remove disk drives or other storage devices.**

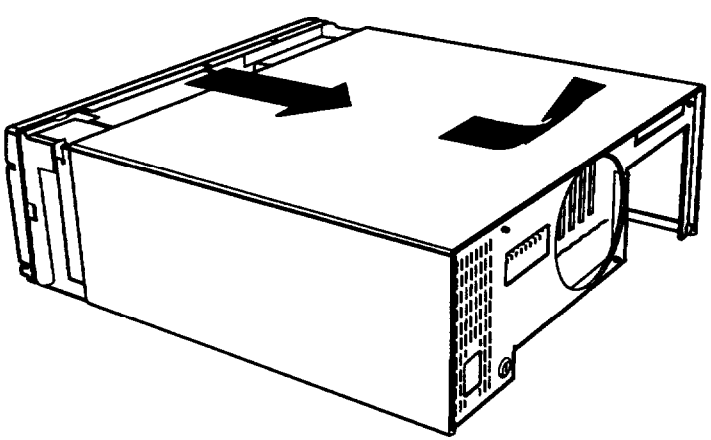
Follow these steps to remove the cover:

1. **Turn off the computer and any peripheral devices connected to it. Then disconnect the computer's power cord from the electrical outlet and from the back panel. Also disconnect any peripheral device cables that are connected to the computer, including the keyboard cable.**
2. **Turn the computer around so you are facing the back panel.**
3. **If necessary, unlock the computer's cover. (See Chapter 1 for instructions.)**

4. **Loosen the three thumbscrews on the computer's back panel by turning them counterclockwise, as shown below. (The screws disengage but don't come all the way off.)**



5. **Grasp the sides of the cover (toward the front of the computer) and pull it firmly toward you, as shown below. Then lift it up and off the computer.**



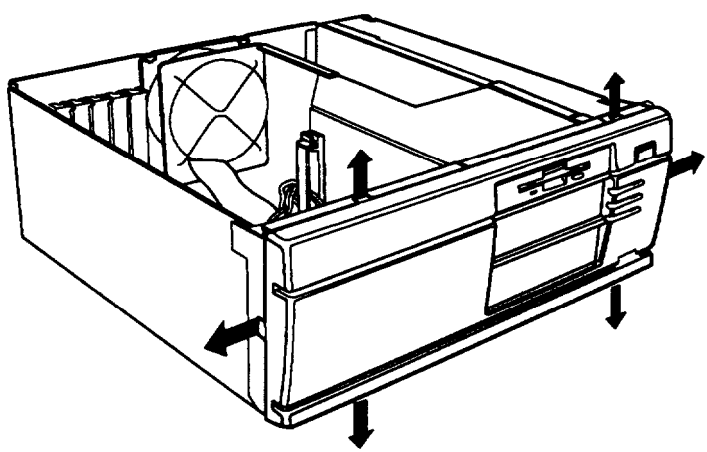
Removing the Front Panel

You must remove the computer's front panel if you need to install or remove a disk drive in an external drive bay or if you need to remove the subassembly from the computer. (If you are installing an internal option, you do not need to remove the front panel.)

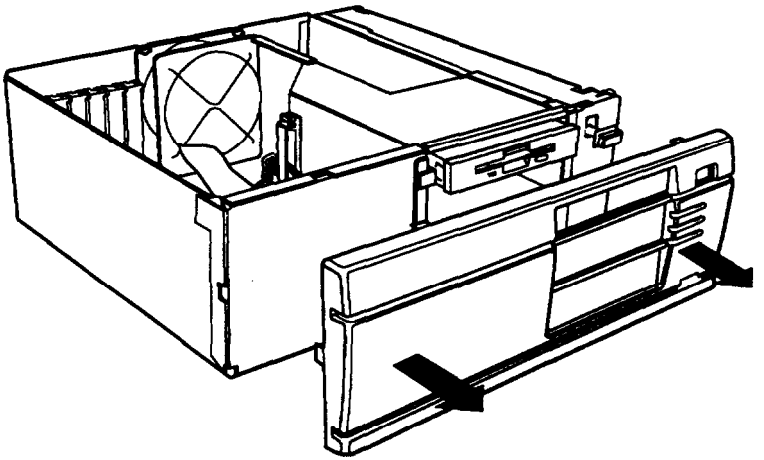
Follow these steps:

1. **Turn the computer so you are facing the front panel.**

2. **Release the six tabs securing the front panel to the computer case, as shown below. You may want to use a flat-blade screwdriver to release the tabs.**



3. **Once the tabs are free, grasp the sides of the front panel and pull it** *straight* **toward you to disengage the two tabs at the bottom, as shown below. Be careful not to pull the panel off at an angle; this may bend or pop off the power and RESET buttons. If a button pops off, carefully place it back on to its post.**

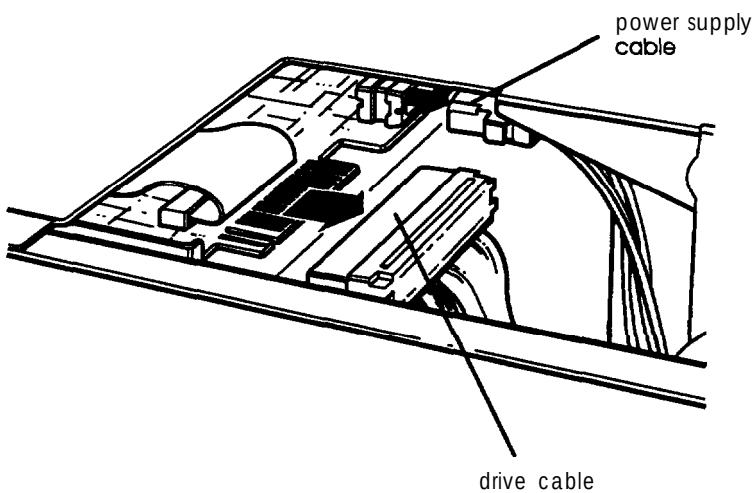


Removing the Subassembly

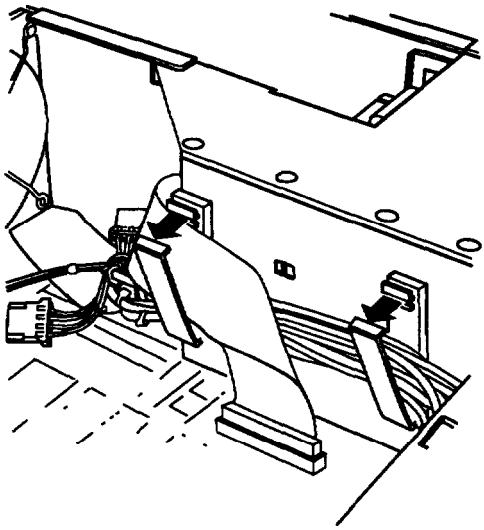
You need to remove the subassembly only if you are installing or removing a hard disk drive that is mounted next to the power supply. (See the installation instructions in Chapter 4 if you are not sure if you need to remove the subassembly.) Follow these steps:

1. **Turn the computer so you are facing the front panel.**

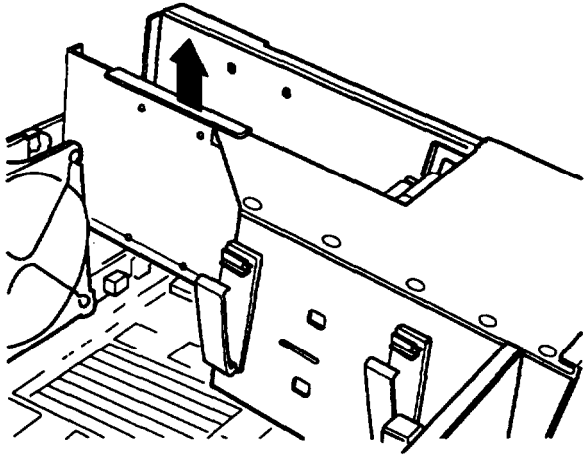
2. **Disconnect the power supply and drive cables from the backs of all the drives installed in your computer, as shown below. Note which cables are connected to which drives so you can easily reconnect them later.**



3. **Open the clasps holding the power supply and drive cables to the side of the subassembly, as shown below. Then remove all the cables from the clasps. (Do not disconnect any cables from the main system board.)**



4. **Grasp the back of the subassembly by the edge on its upper left side, as shown below, and lift up the back end.**



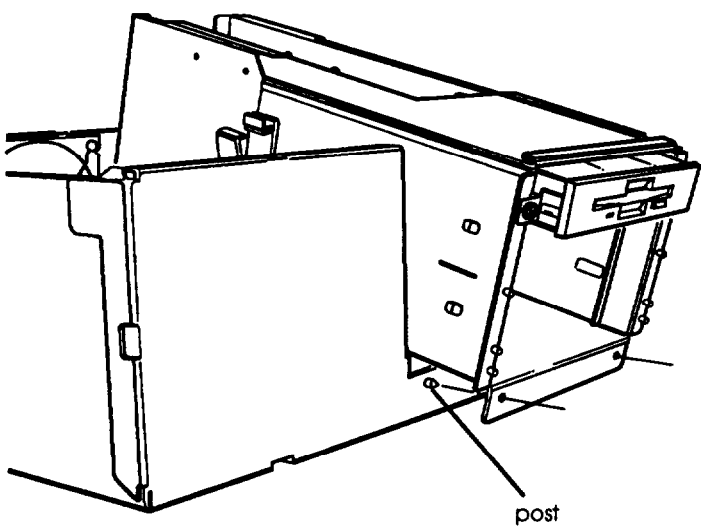
5. **Pull the subassembly forward slightly to release it from the two pins beneath the front panel opening. Then lift it out of the computer and place it on your work surface.**

Replacing the Subassembly

Follow these steps to replace the subassembly:

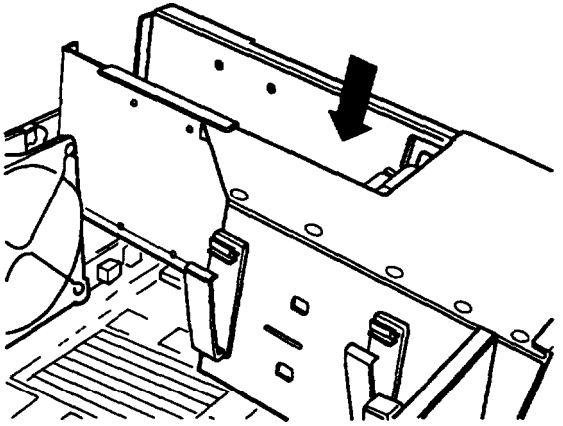
1. **Turn the computer so you are facing the front panel.**

2. **Hold the subassembly at a slight angle and guide the front of it down through the opening in the front of the computer, as shown below.**

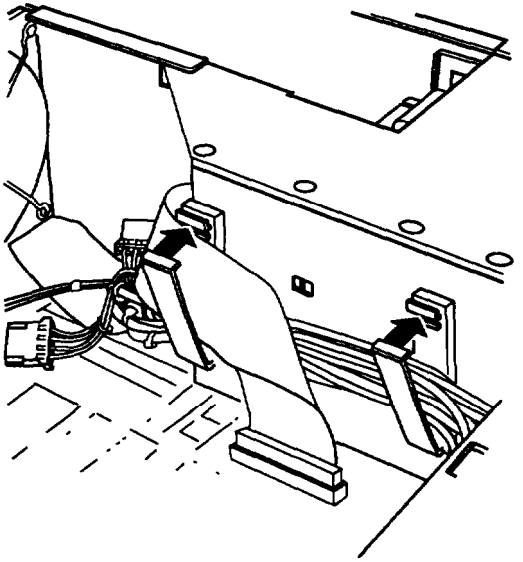


3. **Fit the two holes in the lower front of the subassembly over the two posts on the front of the computer case, as shown above.**

4. **Lower the back end of the subassembly into the computer. If necessary, fit the post beneath the back right edge of the subassembly into the hole on the top of the power supply. Then lower the subassembly all the way down.**



5. **Gather the power supply and drive cables in the clasps on the side of the subassembly; then shut the clasps.**



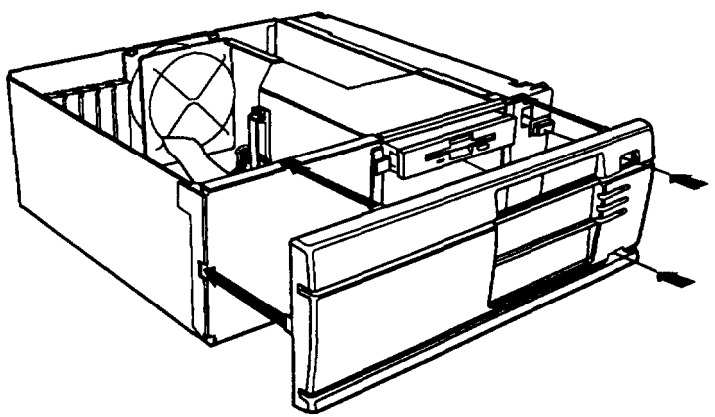
6. **Now you need to connect the drive and power supply cables to the backs of all your drives. See "Connecting the Cables" on page 4-9 for instructions. (If you also need to connect the diskette and/or hard disk drive cables to the main system board, follow steps 4 through 6 on pages 4-21 through 4-23.)**

Replacing the Front Panel

Follow these steps to replace the computer's front panel:

1. **Turn the computer so you are facing the front.**

2. **Align the openings in the front panel with the power and RESET buttons, and any drives that extend out from the front of the computer case. Also align the front panel tabs with the corresponding notches in the case. Then guide the front panel straight onto the case, as shown below.**



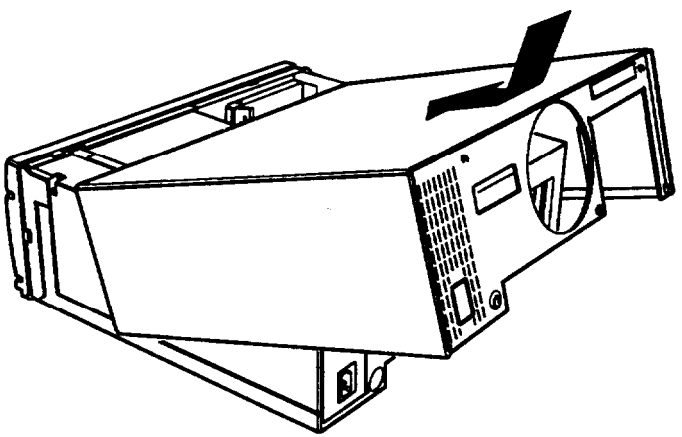
3. **Press the front panel onto the computer to fully insert all the tabs into the notches. If all the front panel tabs do not click into position, remove the front panel and try again.**

Rep/acing the Cover

Follow these steps to replace the computer's cover:

1. **Turn the computer so you are facing the back panel.**

2. **Hold the cover at a slight angle, as shown below, and lower the front part onto the computer. Then lower the back of the cover.**



3. **Slide the cover forward until the front edge overlaps the top edge of the front panel.**

4. **Tighten the three thumbscrews on the back panel to secure the cover to the computer.**

5. **Lock the cover onto the computer, if desired. (See Chapter 1 for instructions.)**

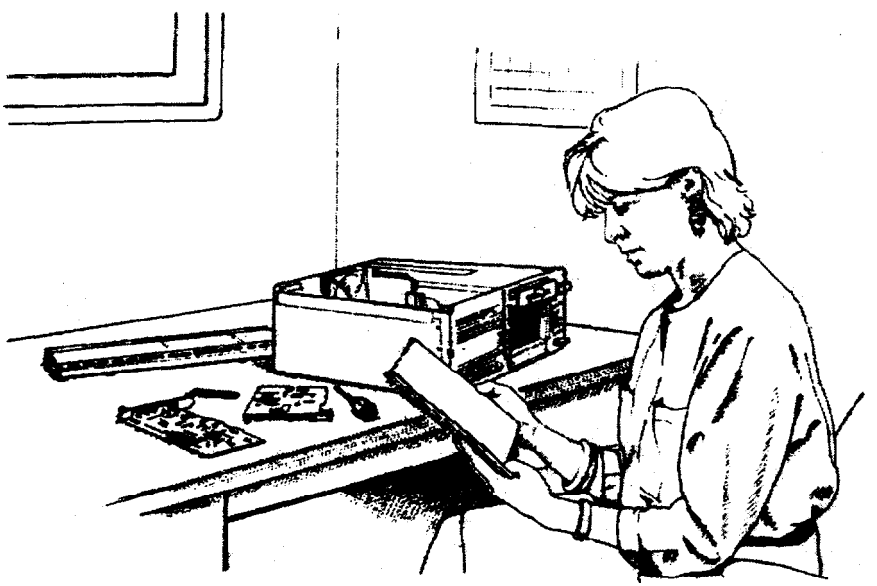
6. **Reconnect your monitor, printer, keyboard, and any other peripheral devices you have. Then reconnect the power cord to the back of the computer and to an electrical outlet.**

Chapter 3

Installing and Removing Options

You can enhance the performance of your computer by adding a variety of options or upgrading your system components, including the following:

- **Option cards**
- **Memory modules**
- **Upgraded CPU card**
- **Intel OverDrive module**
- **Math coprocessor**
- **Enhanced video daughterboard.**



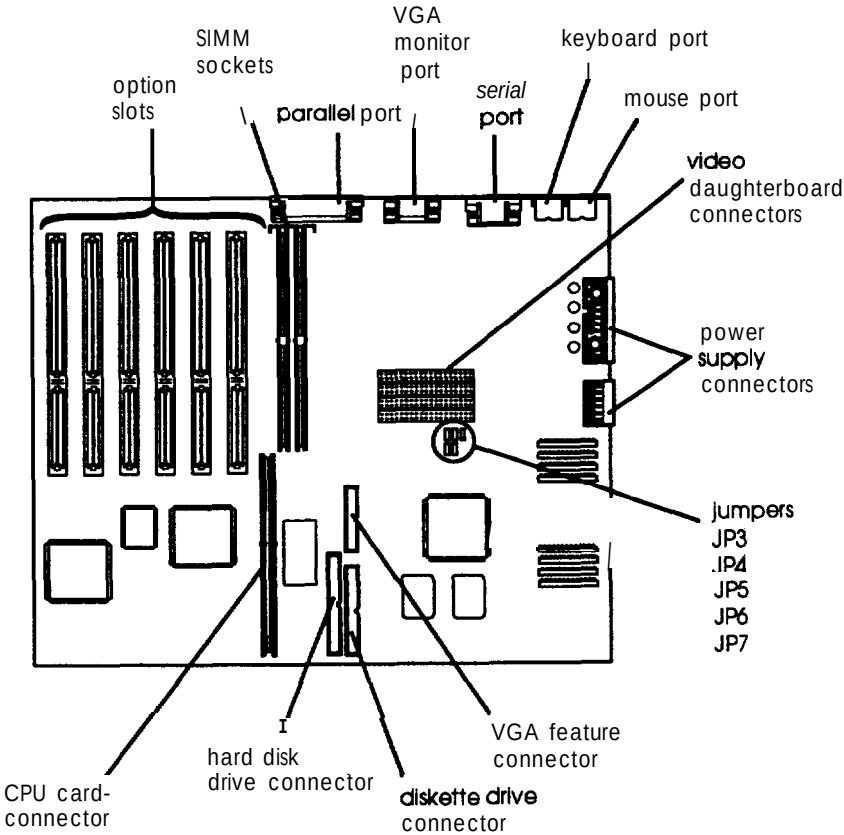
This chapter provides instructions for installing the options listed above, and for changing the jumper settings inside the computer. Be sure to check the jumper information if you install or remove any options in your computer.

On the next page, you'll find an illustration of your main system board which shows the location of any components you may need to locate.

All the instructions in this chapter assume you have removed the computer's cover; if not, see Chapter 2 for the procedure. When you finish everything you need to do inside the computer, return to Chapter 2 for instructions on replacing the cover.

Main System Board Map

As you follow the instructions in this chapter and in Chapter 4, use the illustration below to locate the necessary components on your main system board.



Jumper Settings

A jumper is a small electrical connector that controls one of the computer's functions. The jumper settings in your computer are preset at the factory; however, you can control certain features by changing the standard settings as follows:

- **Enable or disable the built-in mouse port**
- **Enable or disable an external mouse port**
- **Set your monitor type to monochrome or color**
- **Enable or disable the power-on password function**
- **Enable or disable the built-in VGA display adapter.**

If you need to change any jumper settings, or if you want to check the current settings, follow the instructions in this section. Refer to the "Main System Board Map" on page 3-3 to locate the jumpers.

The following table lists the main system board jumper settings and their functions.

Main system board jumper settings

Jumper number	Jumper setting	Function
JP3	A* B	Enables the built-in mouse port Disables the built-in mouse port so you can use an external mouse port on an option card
JP4	A B*	Enables an external mouse port on an option card Disables an external mouse port
JP5	A* B	Color monitor is installed Monochrome monitor is Installed
JP6	A B*	Disables the password function Enables the password function
JP7	A* B	Enables the built-in VGA display adapter Disables the built-in VGA display adapter so you can use a display adapter on an option card

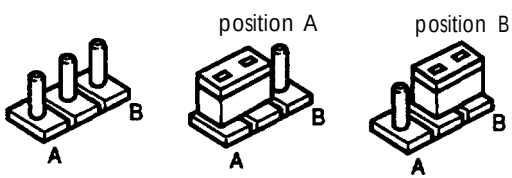
* Factory setting

Setting the Jumpers

If you need to change any jumper settings on the main system board, follow these steps:

1. **Refer to the table above to identify which jumper setting(s) you need to change. See the "Main System Board Map" on page 3-3 to locate the jumpers.**

2. **A jumper's setting is determined by where the jumper is placed on the pins. The jumper connects either pin A and the middle pin (position A) or pin B and the middle pin (position B), as shown below.**



To move a jumper from one position to the other, use needle-nose pliers or tweezers to pull it off its pins and move it to the desired position. Take care not to lose the jumper.

> Caution
> **Be careful not to bend the jumper pins or damage any surrounding components on the main system board.**

Option Cards

An option card is a circuit board you install in your computer to add a particular function. Most option cards contain a device, such as a modem, or provide an interface, such as a serial port.

Your computer has six 16-bit option slots, each of which can accommodate an option card. You can buy option cards from authorized Epson dealers as well as other vendors.

Before you install an option card, check the power requirements given in the card's documentation. Make sure that the power required by the card does not exceed the power limit for its slot, and that the total power for all the cards does not exceed the power limits for all six slots. The table below lists the power limits.

Option slot power limits

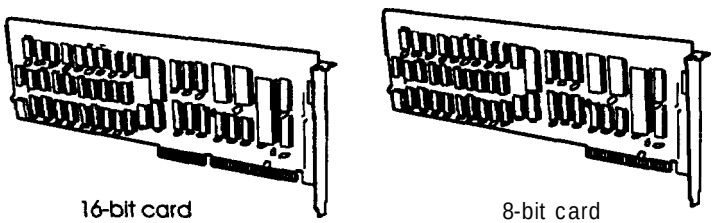
Maximum current	+5 volts	+12 volts	*-5 Volts and -12 Volts*
For each slot	7 Amps	1.5 Amps	0.5 Amps
For all six slots	16 Amps	3 Amps	0.5 Amps

Caution

Although the computer's power supply is protected against excessive power loads, you could still damage the main system board if you install an option card that draws more power than the limits shown in the table.

This section explains how to install option cards in your computer. If you need to remove an option card later, see "Removing an Option Card" on page 3-10 for instructions.

The illustration of the main system board on page 3-3 shows the six standard option slots inside your computer. You can install either 8-bit or 16-bit option cards in these slots. As you can see below, a 16-bit card has an extra connector along the bottom.



Usually it does not matter which slot an option card occupies, as long as it fits in the slot. However, you must follow these guidelines when deciding which slot to use:

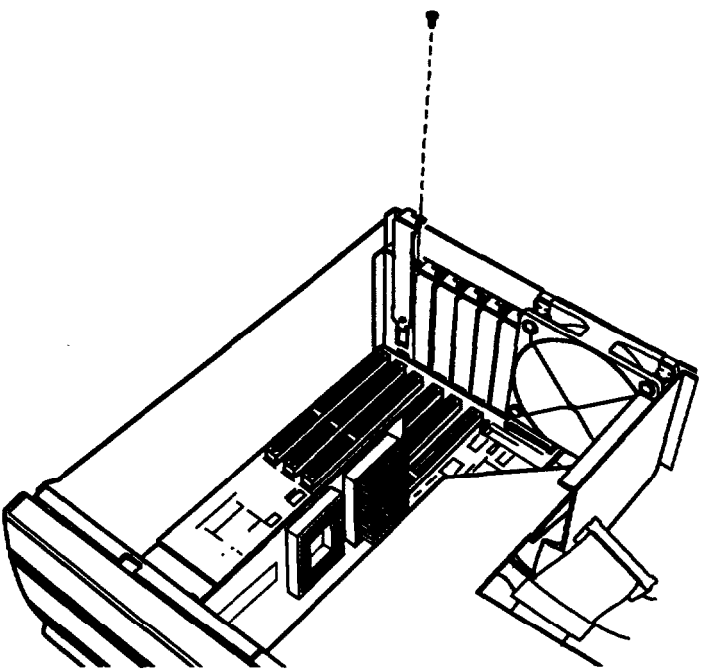
- **You cannot install an 8-bit card that has an additional tab along the bottom.**
- **Some option cards must be installed in a specific slot. Consult the instructions that come with the card to see if this is the case.**
- **If you install a disk drive that uses a controller card, place the card as close as possible to the drive it is controlling.**

Installing an Option Card

Follow these steps to install an option card

1. **If you are installing an option card that controls a mouse, you may need to change the setting of jumper JP3 or JP4 before you install the card. If you install a display adapter card, you may need to change the settings of jumpers JP5 and JP7. See page 3-4 for instructions.**

2. **Remove the retaining screw from the top of the metal option slot cover; hold on to the screw so it doesn't fall into the computer. Then lift out the slot cover.**

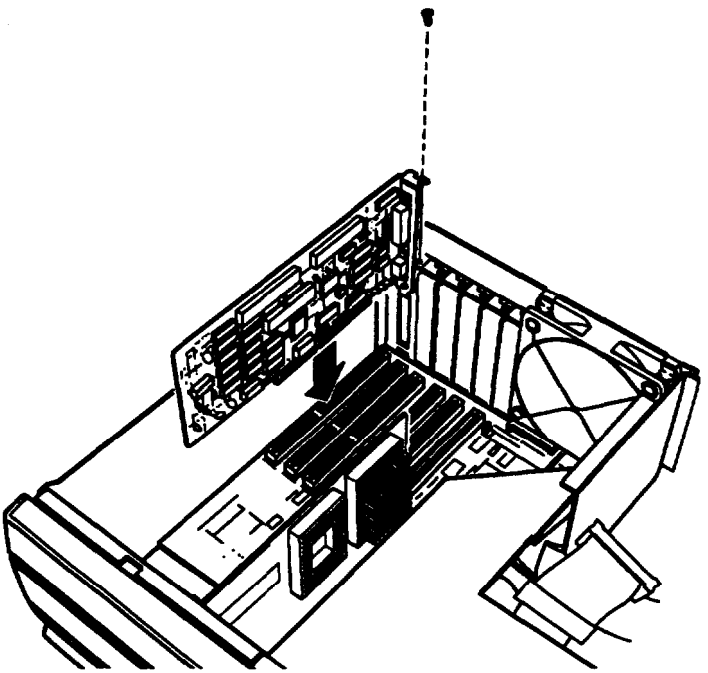


Keep the screw to secure the option card to the computer. Store the slot cover in a safe place in case you remove the option card later.

3. **Unpack the option card. When you handle it, be careful not to touch any of the components on the card or the gold-edged Connectors If you need to set it down before you install it, place it gently on top of its original packing materials with the component side facing up. Keep the packing materials in case you remove the card later.**

   Adjust any switches or jumpers on the card, if necessary. (Check the option card instructions.)

4. **Holding the card by the top comers, position it over the slot as shown below.**



Insert the card into the slot, guiding it straight down. If the card does not go in smoothly, do not force it; pull it all the way out and try again, keeping it straight as you insert it. Examine the card to verify that it is fully seated in the slot.

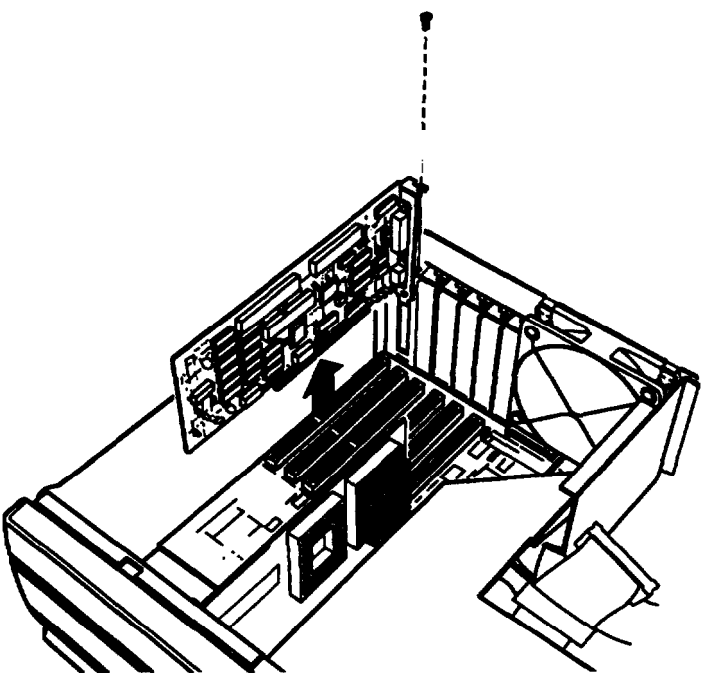
5. **Secure the end of the card to the back of the computer with the retaining screw.**

6. **After you replace the computer's cover, check the documentation that came with your card to see if there are any post-installation procedures you need to perform before you start using the option. If you installed a card with an additional interface, you may need to run SETUP to change one of the computer's built-in interface settings. See Chapter 2 of the *Setup Guide* for instructions.**

Removing an Option Card

If you need to remove an option card, follow these steps:

1. **Remove the screw securing the card to the back of the computer and pull it straight up and out of the slot.**



2. **Cover the option slot opening with the original metal slot cover and secure it with the retaining screw.**

3. **If you are removing an option card that controls a mouse, you may need to change the setting of jumper JP3 or JP4 on the main system board. If you are removing a display adapter card, you may need to change the settings of jumpers JP5 and JP7. See page 3-4 for instructions.**

4. **If you made any system configuration changes when you installed the card, change them again as necessary after you remove the card and replace the computer's cover.**

Memory Modules (SIMMs)

Your computer comes with 4MB of memory soldered onto the main system board. By installing memory modules-also called SIMMs (single inline memory modules)--you can increase the amount of memory in your computer up to 128MB.

> **Caution**
> **It is best to have your dealer install memory modules for you because they can be damaged easily if installed incorrectly. If you prefer to install them yourself, carefully follow all the instructions in this section.**

Before you install SIMMs, check the following guidelines to ensure that they will work properly:

- **Use only 36-bit, fast-page mode SIMMs that operate at an access speed of 70ns (nanoseconds) or faster. Be sure all the SIMMs operate at the same speed.**

- **Use the correct SIMM configuration to add the amount of memory you want. See the table on the next page.**

- **Although your computer can use any SIMM that complies with industry standards, it is best to use Epson SIMM option kits to ensure reliability and compatibility. If you choose another type of SIMM kit, check the shape of the SIMM to make sure it will fit in your computer. (Some manufacturers' SIMMs are longer on one side, which prevents them from fitting inside the socket correctly.)**

There are two SIMM sockets on the main system board, and each can contain one memory module. You can install SIMMs with a capacity of 1MB, 4MB, 16MB or 64MB.

The following table shows the possible SIMM configurations; do not install memory in any other configuration. Remember that there is already 4MB of memory soldered onto the main system board.

SIMM configuration

Socket U11	Socket U12	Total memory
		4MB *
1MB		5MB
	1MB	5MB
1MB	1MB	6MB
4MB		8MB
	4MB	8MB
4MB	1MB	9MB
1MB	4MB	9MB
4MB	4MB	12MB
16MB		20MB
	16MB	20MB
16MB	1MB	21MB
1MB	16MB	21MB

SIMM configurations (continued)

Socket U11	Socket U12	Total memory
16MB	4MB	24MB
4MB	16MB	24MB
16MB	16MB	36MB
64MB **		68MB
	64MB **	68MB
64MB **	1MB	69MB
1MB	64MB **	69MB
64MB **	4MB	72MB
4MB	64MB **	72MB
64MB **	16MB	84MB
16MB	64MB **	84MB
64MB **	44MB * *	128 MB t

* Standard soldered memory
** Check with your dealer to see If this SIMM Is available
t With this memory configuration, the 4MB of soldered memory Is disabled.

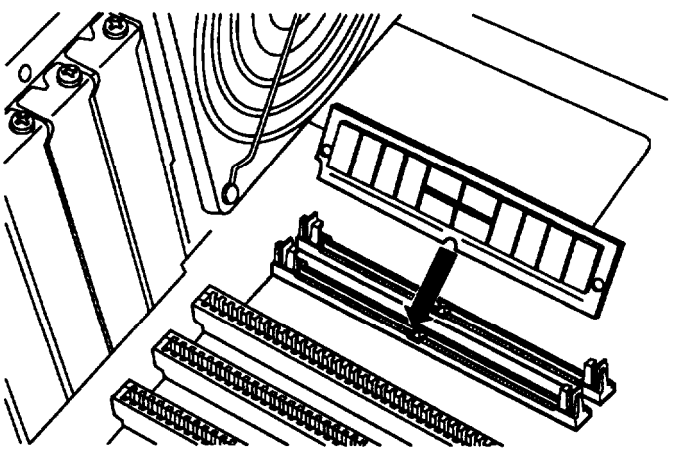
Once you have the SIMMs you need, you or your dealer can install them in your computer. If you want to install them yourself, follow the instructions below.

Installing SIMMs

Follow these steps to install SIMMs:

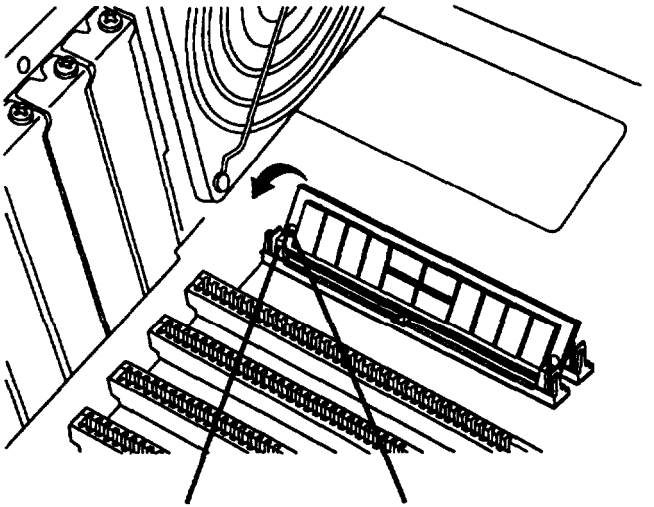
1. **Refer to the "Main System Board Map" on page 3-3 to locate the SIMM sockets (at the back of the board, toward the middle).**

2. **If you are installing two SIMMs, it is easiest to install the first SIMM in the left socket (labelled U12) first. Position it at an angle, as shown below, with the components facing toward the option slots.**



Make sure you orient the SIMM in the correct direction before you push it into the socket.

3. **Gently push the SIMM into the socket and then tilt it left until it is vertical, guiding the holes at each end of the SIMM over the retaining posts at each end of the SIMM socket.**



The SIMM should snap into place over the retaining posts. If it does not go in smoothly, do not force it; pull it all the way out and try again.

Make sure the SIMM is fully inserted into the socket and that the pins on the retaining posts extend through the holes in both ends.

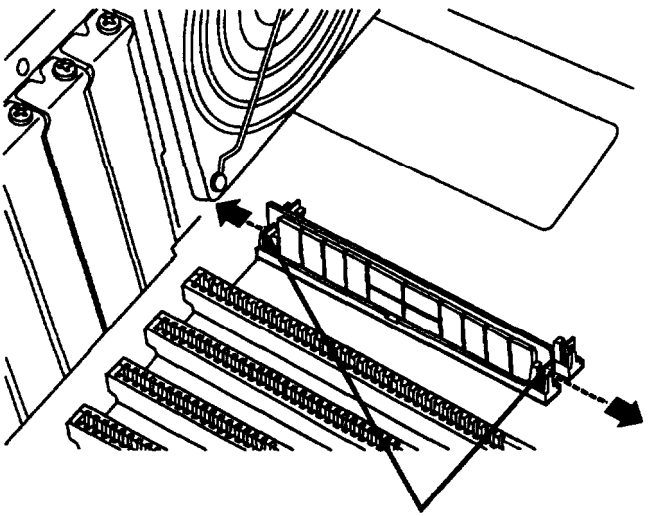
4. **If you are installing a second SIMM, repeat steps 2 and 3 to install it in the other socket.**

5. **After you replace the computer's cover, be sure to run the SETUP program so your system can update its configuration. See Chapter 2 of the** *Setup Guide* **for instructions.**

Removing SIMMs

If you need to remove SIMMs from your computer, have your dealer do it for you or follow the steps below.

1. **If you are removing two SIMMs, remove the one in the right socket (labeled U11) first. Use your fingers or two small screwdrivers to pull away the tabs that secure the SIMM at each end. Be careful not to pull the tabs too far, or they may break.**



As you pull away the tabs, the SIMM falls to the right at an angle. Release the tabs and lift the SIMM out of the socket.

2. **If you are removing a second SIMM, repeat the procedure described above.**

3. **After you replace the computer's cover, be sure to run the SETUP program so your computer can update its configuration. See Chapter 2 of the** *Setup Guide* **for instructions.**

Replacing the CPU Card

The components for your computer's microprocessor are contained on the CPU card installed inside the computer. This allows you to easily upgrade your system by replacing the CPU card with a faster one. There are three cards available for your computer:

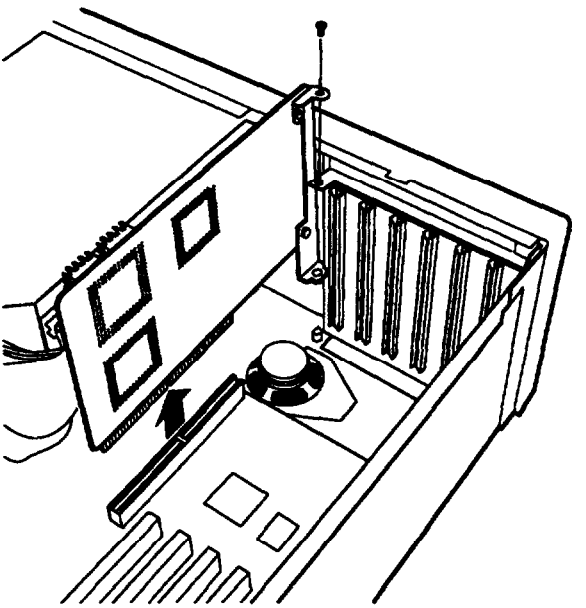
- **486SX/25**
- **486DX/33**
- **486DX2/66.**

The instructions in this section describe how to remove the card installed in your computer and install a new one. You also need to perform these procedures if you want to install an OverDrive module or a math coprocessor on the CPU card.

Removing the CPU Card

Follow these steps to remove the CPU card from your computer:

1. **Remove the retaining screw securing the card to the front of the computer case, as shown below.**



2. **Pull the card straight up and out of its socket, as shown above.**

3. **If you are installing a new CPU card, follow the instructions on the next page.**

   If you are installing a math coprocessor or OverDrive module, see the appropriate section later in this chapter for instructions. When you are ready to reinstall the CPU card, return to page 3-19 for instructions.

Insfalling the CPU Card

This section explains how to install a CPU card in your computer. You need to do this if you have removed your card to install a math coprocessor or OverDrive module on it or if you are installing a new CPU card.

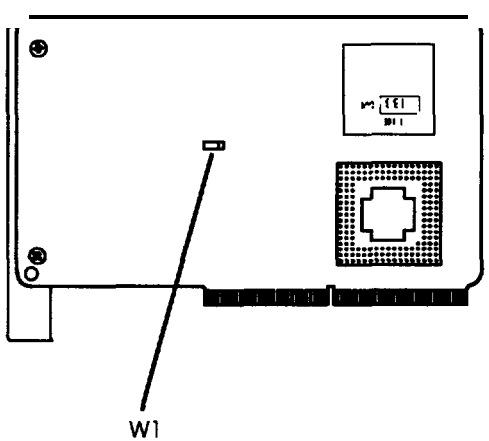
If you are installing the 486DX2/66 card, go on to "Installing the card" on page 3-21. If you are installing the 486SX/25 or 486DX/33 card, read "Checking the jumper settings," below.

Checking the jumper settings

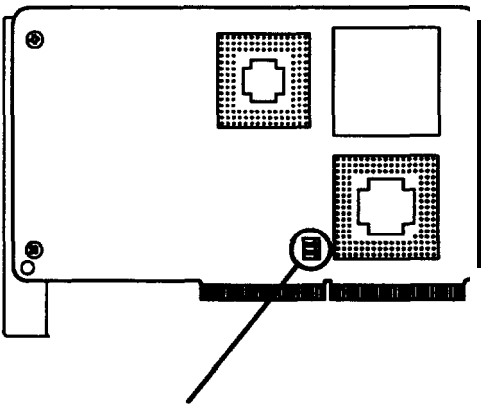
There are jumpers on the 486SX/25 card and the 486DX/33 card that indicate what type of card it is. These jumpers are set to the correct position at the factory, but it is a good idea to check the settings to make sure they are correct. Also, if you install an OverDrive module on the 486DX/33 card, you need to change the setting of one jumper.

The following illustrations show where the jumpers are located on the two CPU cards.

486SX/25



486DX/33



W1,W2.W3

There is only one jumper on the 486SX/25 card, and it should always be set to position B.

If you have the 486DX/33 card, refer to the following table to make sure the jumpers are set correctly before you install the card in your computer, and change them if necessary.

486SX/33 CPU card jumpers

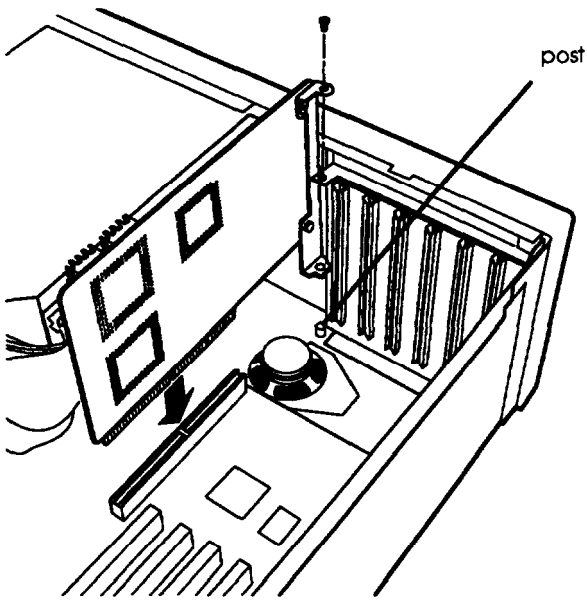
CPU card configuration	Jumper setting		
	W1	W2	W3
Card only; no OverDrive module	A	A	A
ODP486DX/33 module installed	A	A	B

For general information on setting jumpers, see "Jumper Settings" on page 3-4.

Installing the card

Follow these steps to install the CPU card in your computer:

1. **Position the card as shown below, aligning the two connectors on the bottom of the card with the two slots in the socket on the main system board. The hole in the bottom of the bracket should fit over the vertical post on the bottom of the computer case.**



2. **Guide the card straight into the socket until it is firmly seated. If it does not go in smoothly, pull it out and try again.**

3. **Secure the bracket at the end of the card to the front of the computer case with the retaining screw.**

4. **After you replace the computer's cover, run the SETUP program so your computer can update its configuration. See Chapter 2 of the Setup Guide for instructions. (You need only run the program and save the configuration; you do not need to change any settings.)**

Installing on OverDrive Module

If you have the 486SX/25 or 486DX/33 CPU card, you can enhance your system's performance by installing an Intel OverDrive module on the card. This allows you to effectively double the internal clock speed of your computer's microprocessor with a very simple upgrade procedure.

> **Note**
> **Although there is an OverDrive socket on the 486DX2/66 card, there is no OverDrive module available for it at this time.**

The type of module you choose depends on the CPU card you have, as shown in the table below.

Available OverDrive **modules**

CPU card	OverDrive module
486SX/25	ODP486SX/25*
486DX/33	ODP486DX/33**

* If you install this module, you cannot also Install a 487SX/25 microprocessor chip because both options require the same socket.

** Check with your dealer on the availability of this chip.

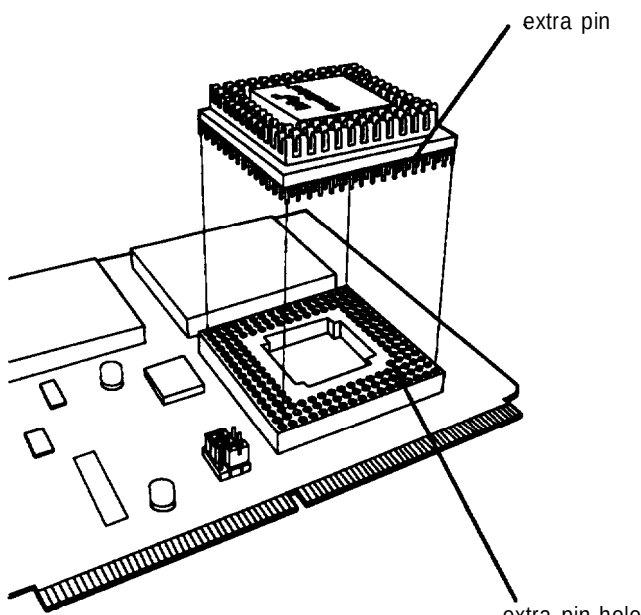
You may prefer to have your dealer install the OverDrive module for you because it can be easily damaged if installed incorrectly. If you decide to install it yourself, be sure to read any documentation that came with it, especially any precautionary information. Then follow the instructions provided with the OverDrive module as well as those given in the appropriate section below to install it on your CPU card.

Caution
To avoid generating static electricity and damaging your OverDrive module, remain as stationary as possible while you install it.

1. **Remove the CPU card as described on page 3-18.**

2. **Place the card on an anti-static work surface with the components facing up.**

3. **Position the OverDrive module above the socket so the comer with the extra pin is over the comer in the socket with the extra hole.**



4. **Gently push the module straight into the socket, pressing evenly on all sides. Examine it to make sure it is inserted all the way into the socket.**

5. **If you installed the ODP486DX/33, you need to change the jumper setting of W3. See page 3-19 for instructions.**

6. **Reinstall the CPU card as described on page 3-19.**

7. **After you replace the computer's cover, run the SETUP program so your computer can update its configuration. See Chapter 2 of the *Setup Guide* for instructions. (You need only run the program and save the configuration; you do not need to change any settings.)**

Installing a Math Coprocessor

A math coprocessor speeds up the numeric calculations your computer performs when using some applications. It also increases the speed at which graphic images are displayed on your monitor when you use certain graphics programs.

Roth the 486DX/33 and the 486DX2/66 CPU cards have a math coprocessor built into the microprocessor, but they also have an additional socket in which you can install a Weitek 4167 math coprocessor. On the 486SX/25 card, you can install a 487SX/25 microprocessor chip in the OverDrive module socket. This microprocessor has a built-in math coprocessor and replaces the 486SX/25 microprocessor on the card.

> **Note**
> **If you install the 487SX/25 microprocessor chip, you cannot also install an OverDrive module on the card because both options require the same socket.**

The following table lists which math coprocessors are available.

Available math coprocessors

If you have this CPU card	You can install this coprocessor
486SX/25	Intel 487SX/25 microprocessor (with built-in coprocessor)
486DX/33	Weltek 4167
486DX2/66	Weltek 4167

Check with your dealer if you are not sure which type of math coprocessor to purchase.

You may prefer to have your dealer install the coprocessor for you because it can be easily damaged if installed incorrectly. If you decide to install the coprocessor yourself, be sure to read any documentation that came with it, especially any precautionary information. Then follow the instructions provided with the coprocessor as well as those given in the appropriate section below to install it on your **CPU card.**

Caution

To avoid generating static electricity and damaging your math coprocessor, remain as stationary as possible while you install it. Also, be careful not to touch the metal pins on the chip.

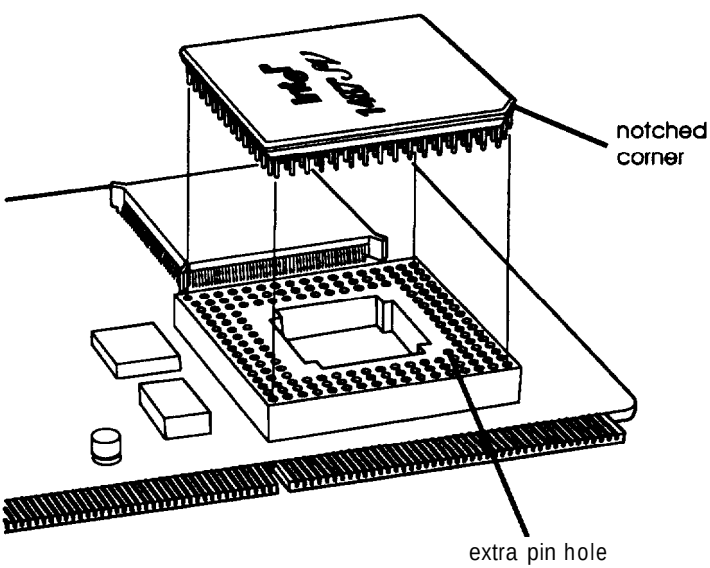
Installing the Intel 487SX/25 Microprocessor

Carefully follow these steps to install an Intel 487SX/25 microprocessor on the 486SX/25 CPU card

1. **Remove the CPU card as described on page 3-18.**

2. **Place the card on an anti-static work surface with the components facing up.**

3. **Position the microprocessor over the socket as shown below. Align the notched comer of the microprocessor over the comer in the socket with the extra pin hole.**



Caution
Be sure to all the pins in the microprocessor directly over the holes in the socket. If you insert the microprocessor in the wrong position, you could permanently damage it.

4. **Make sure the pins in the microprocessor are directly over the holes in the socket. Then gently push it straight into the socket, pressing evenly on all sides.**

5. **Reinstall the CPU card as described on page 3-19.**

6. **After you replace the computer's cover, be sure to run the SETUP program so your computer can update its configuration. (See Chapter 2 of the *Setup Guide* for instructions.) Additionally, if the microprocessor came with any diagnostic software, you may want to run it to test the new microprocessor. (See the documentation for instructions.)**

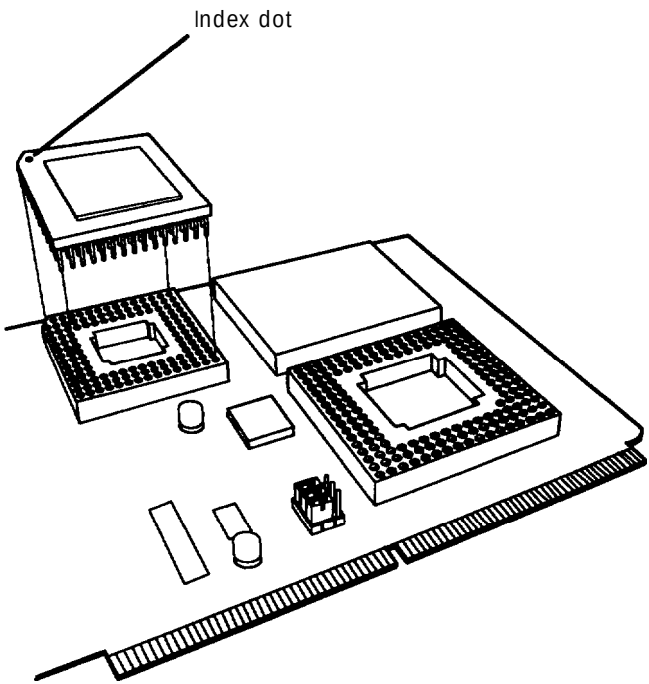
installing a Weitek 4167 Coprocessor

Carefully follow these steps to install a Weitek 4167 math coprocessor on either the 486DX/33 or 486DX2/66 card:

1. **Remove the CPU card as described on page 3-18.**

2. **Place the card on an anti-static work surface with the components facing up.**

3. **Position the coprocessor over the socket as shown below. Align the notched corner of the coprocessor-marked with the orientation (index) dot-over the corresponding comer in the socket.**



> **Caution**
> **Be sure to align the pins in the coprocessor directly over the holes in the socket. If you insert the math coprocessor in the wrong position, you could permanently damage it.**

4. **Make sure the pins in the coprocessor are directly over the holes in the socket. Then gently push the coprocessor straight into the socket, pressing evenly on all sides.**

5. **Reinstall the CPU card as described on page 3-19.**

6. **After you replace the computer's cover, be sure to run the SETUP program so your computer can update its configuration. (See Chapter 2 of the *Setup Guide* for instructions.) Additionally, if the math coprocessor came with any diagnostic software, you may want to run it to test the coprocessor. (See the documentation for instructions.)**

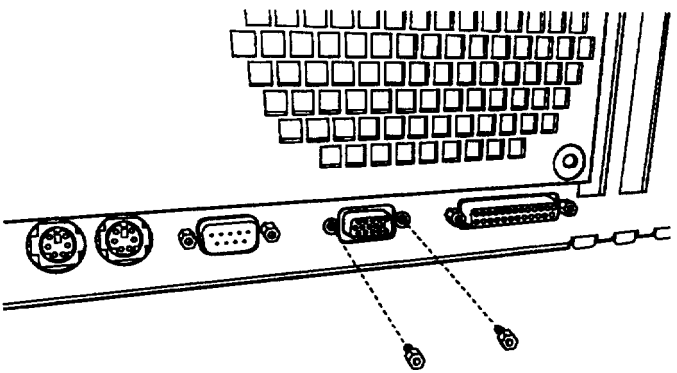
Replacing the video Daughterboard

Your computer's video interface is provided by a video daughter-board installed on the main system board. Although the circuitry for controlling your VGA monitor resides on the main system board, the removable video daughterboard allows you to easily updgrade your maximum VGA resolution from 1024 x 768 to 1280 x 1024. The enhanced video board also provides an additional 1MB of video RAM and 24-bit true color display capability.

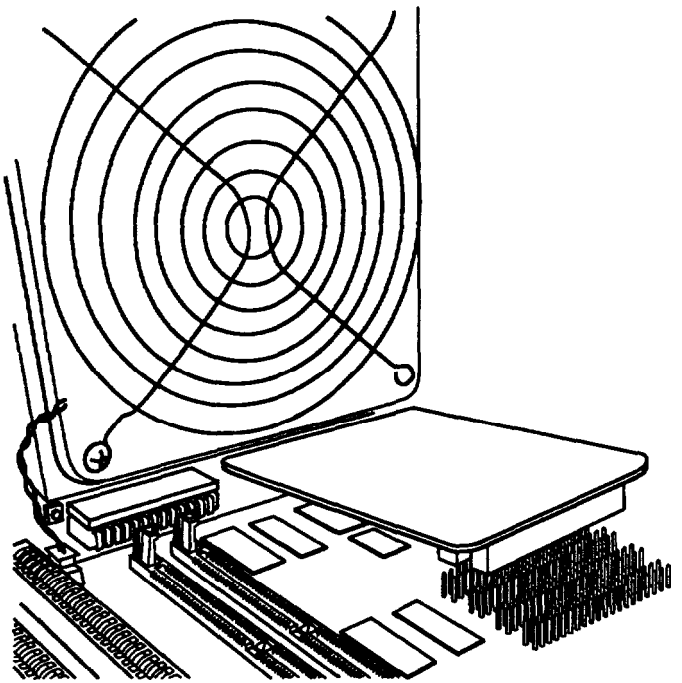
> **Note**
> **Your monitor must be able to display the higher resolutions in order to take advantage of the enhanced features.**

Follow these steps to remove the video daughterboard in your computer and install the enhanced one:

1. **Remove the two hex screws securing the video port to the back of the computer. (If you do not have an appropriate hex driver to remove the screws, you can try using a small pair of needle-nosed pliers; but be careful not to damage the screws or the interface port.) Set the screws aside in a safe place.**

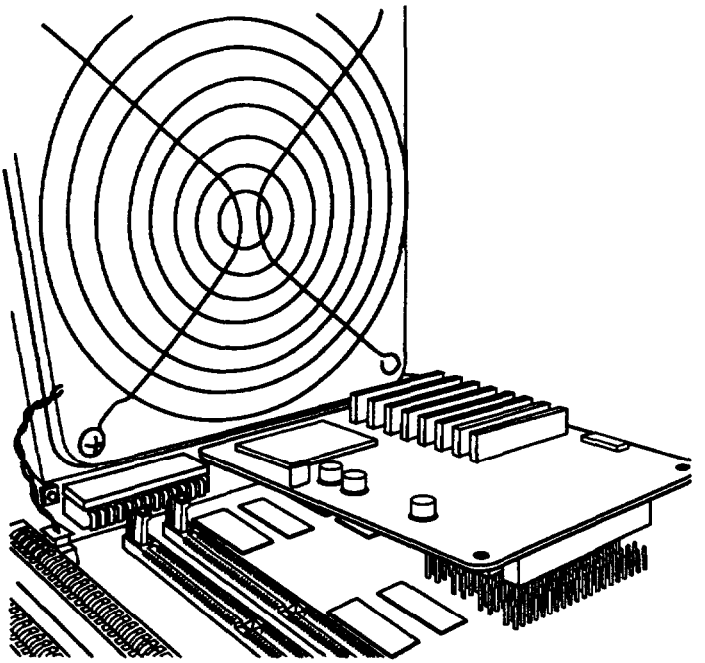


2. **The daughterboard has two sockets which fit over two of the four pin connectors on the main system board (the two closest to the back panel). To remove the daughterboard, carefully lift up the socketed end of the board to release it as shown in the following illustration. Then remove the board from the computer and set it aside.**



Wrap the old board in an anti-static bag and store it in a safe place in case you need it later.

3. **The enhanced daughterboard has four sockets which fit over the four pin connectors on the main system board. To install it, guide the board into the computer so the interface port extends through the opening in the back panel. Then align the daughterboard's four sockets over the pin connectors on the main system board, as shown below.**

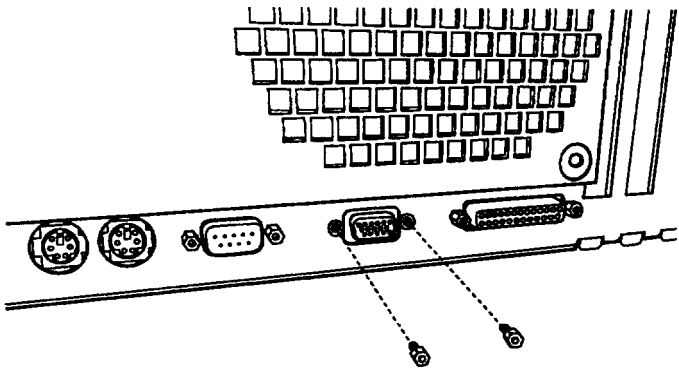


Caution

Be sure to carefully align the holes in the sockets over the connector pins on the main system board. If you install the daughterboard in the wrong position, you could permanently damage it and destroy the components on the main system board.

4. **When you are sure the pins and holes are aligned correctly, push the board into place, pressing evenly on all sides. Be careful not to bend any pins.**

5. **Secure the port to the back of the computer with the two hex screws you removed in step 1.**



6. **Refer to the** *VGA Utilities Guide* **for instructions on installing video drivers for your new, higher resolutions.**

Using the VGA Feature Connector

The VGA feature connector on your computer's main system board allows you to connect an optional, high-resolution graphics adapter card interface cable. See the "Main System Board Map" on page 3-3 to locate the connector.

If you want to attach a graphics adapter card cable to the VGA feature connector, follow these steps:

1. **Install the graphics adapter card in your computer. See "Installing an Option Card" on page 3-8 for instructions.**

2. **Attach the cable that came with your graphics card to the interface on the card itself. Check your graphics card manual for more information.**

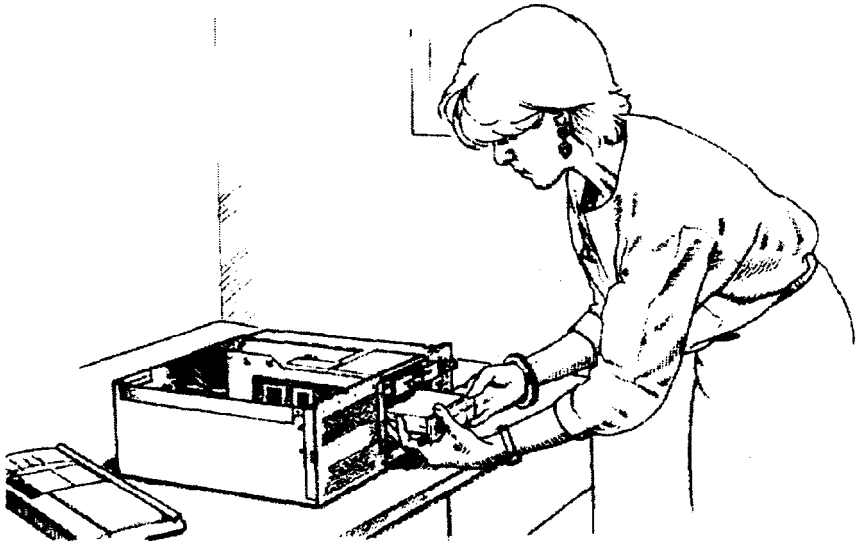
3. **Attach the other end of the graphics card cable to the VGA feature connector on the main system board.**

> **Note**
> **You do not need to disable the built-in VGA adapter if you connect your graphics adapter card to the feature connector.**

Chapter 4
Installing and Removing Drives

The instructions in this chapter describe how to install and remove optional Epson drives in your computer. You can use these instructions to install a variety of devices, including diskette drives, hard disk drives, a CD-ROM, or a tape drive. Although your drive may look different from the ones illustrated here, you should be able to install it the same way.

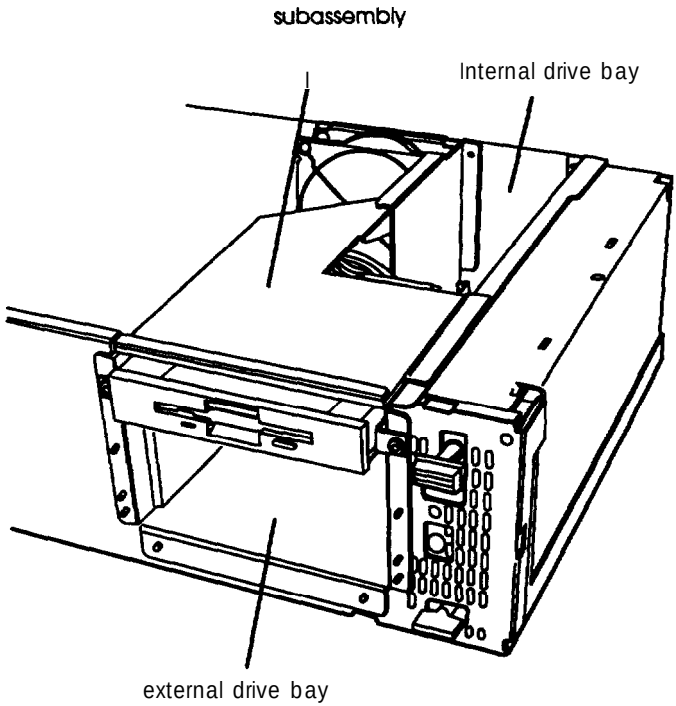
If you are installing or removing a non-Epson drive, some of the steps in this chapter may not apply; see the documentation that came with your drive for more information.



before you perform any of the procedures described below, remove the computer's cover as described in Chapter 2. You may also need to remove the front panel and subassembly; the instructions in this chapter tell you when this is necessary.

Choosing the Correct Drive Bay

Your system can hold up to five drives. As shown below, there are two drive bays in the computer's subassembly: the external drive bay and the internal drive bay.



The external drive bay holds up to three drives. The top slot is occupied by the third-height diskette drive that came with your system. You can use the remaining space for either two half-height drives or one full-height drive.

You can install either one full-height or two half-height hard disk drives in the internal drive bay.

If you are installing a hard disk, it is best to install it in the internal bay. This reserves the external bay for any devices that need to be accessible from the outside, such as a diskette drive or tape drive. If you prefer, however, you can install a hard disk in the external bay.

Installation/Removal Sequence

before you begin, check the table below to make sure you perform all the necessary steps in the proper sequence.

Installation/removal guide

If you are . . .	Begin with this section . . .
Installing a hard disk drive or removing one and leaving another in the computer	'Checking the IDE Hard Disk Drive Jumpers' on page 4-4
Removing your only hard disk drive	'Removing a Hard Disk Drive From the Internal Bay' on page 4-25
Installing a diskette drive or other device	'Installing a Drive In the External Bay' on page 4-6
Removing a diskette drive or other device	'Removing a Drive From the External Bay' or page 4-14.

Information in each of these sections guides you to the instructions you should follow next.

When you finish installing or removing your drive(s), see "Post-installation Procedures" at the end of this chapter for additional steps you may need to perform.

Checking the IDE Hard Disk Drive Jumpers

IDE (Integrated Drive Electronics) hard disk drives have jumpers that must be set for the drive to work properly with your computer. The jumpers tell the computer whether you are using one hard disk drive or two. If you purchased your system with a hard disk drive already installed, these jumpers have been set for you. You may need to change the jumper settings if you install or remove a hard disk drive.

> **Note**
> **You do not need to set these jumpers if you are removing your only hard disk drive.**

Check the jumper settings if you are doing any of the following:

- **Installing your first hard disk drive**
- **Removing one hard disk drive and leaving another in your computer**
- **Installing a second hard disk drive.**

See the documentation that came with your hard disk drive for the proper settings. If you install two hard disk drives in your system, you must change the jumper settings on each drive to indicate which drive is the master (primary) drive and which is the *slave* (secondary) drive.

A master drive is the drive on which you'll install the operating system that the computer loads into its memory each time you turn it on. You can run application programs and store data on both the master and slave drive, but the operating system must be contained on the master drive.

> **Note**
> **If you are removing one hard disk drive and leaving one in your computer, be sure to set the jumpers on the remaining drive to indicate that you have only one hard disk drive.**

Where to Go Next

If you are installing your first hard disk drive (i.e., there is no other hard disk in your computer), you should install it in the internal drive bay. Go to page 4-16.

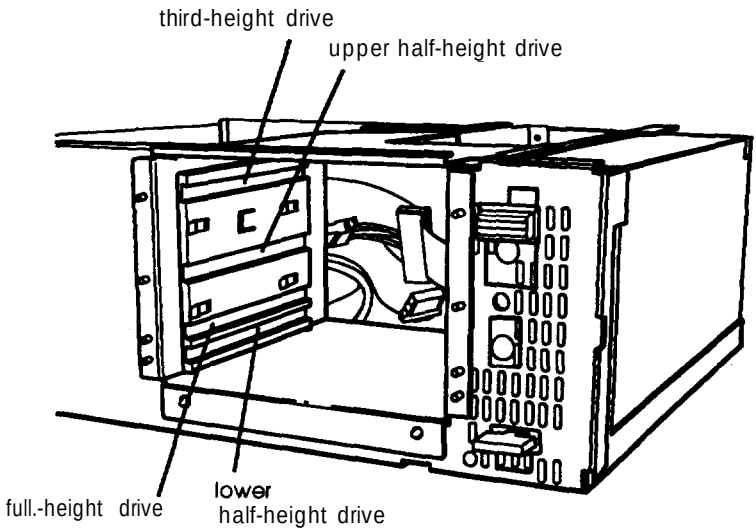
If you are installing your second hard disk drive, you can install it in the external or internal drive bay (although you may want to reserve the slots in the external drive bay for diskette drives or other accessible devices). To install a hard disk drive in the internal bay, go to page 4-16. To install it in the external bay, see the following section.

To remove a hard disk drive from the external bay, go to page 4-14. To remove a drive from the internal bay, go to page 4-25.

Installing a Drive in the External Bay

This section describes how to install an Epson diskette drive; however, you can use these instructions to install another type of storage device in the external bay. See the manual that came with it for additional installation instructions.

On each interior side of the external drive bay, there is a plastic guide with four support grooves, as shown below. When you install a drive, you decide which grooves to use depending on the size of your drive and where you want it to be. The third-height diskette drive that comes with your computer is already installed in the grooves at the top of the bay.



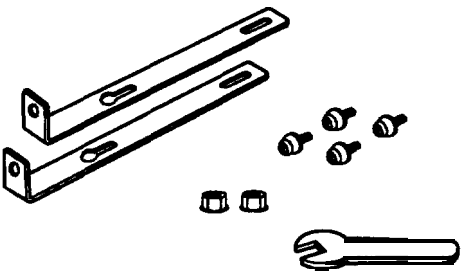
Note

The external drive bay is designed for drives that are 5 ¼ inches wide. If you are installing a drive that is 3 ½ inches wide, it must have a mounting frame (or frames) installed on it. If necessary, follow the instructions included with the drive to install the frame(s).

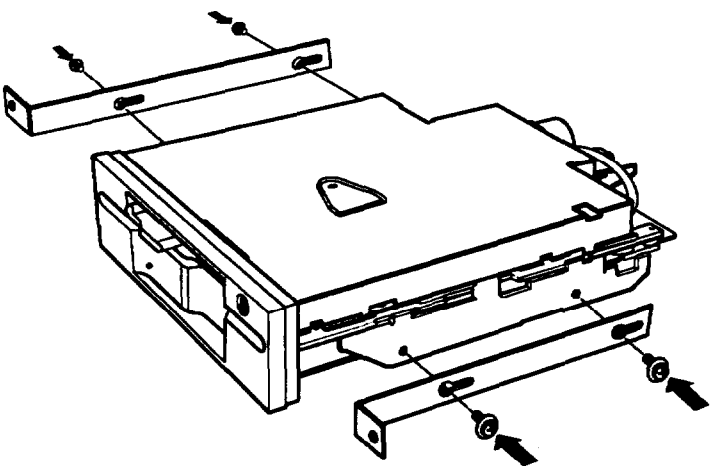
Follow these steps to install a disk drive in the external bay:

1. **Locate the following parts included with your computer:**

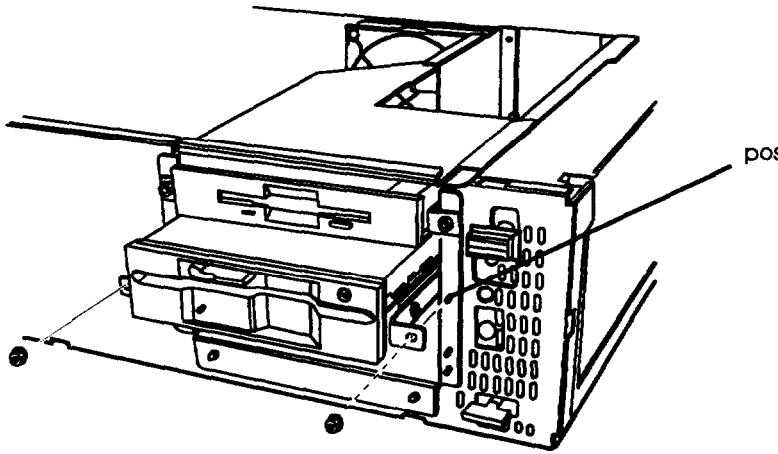
   - ❑ **Two metal drive brackets**
   - ❑ **Four retaining screws (with attached flat washers)**
   - ❑ **Two nuts (with attached star washers)**
   - ❑ **Small wrench.**



2. **Attach one bracket to each side of the drive, as shown below. Secure each bracket loosely with two of the retaining screws. (Do not tighten the screws now; you may need to adjust the drive position by moving it along the bracket.)**



3. **Slide the drive into the bay as shown below, guiding the bracket screws on each side along the appropriate grooves in the drive bay.**



4. **Guide the holes in the front of the brackets over the threaded posts on the front of the subassembly, as shown above. Then push the drive into the bay so that the bracket lies flush against the front of the drive bay.**

5. **Loosely secure the drive to the drive bay temporarily with the two nuts.**

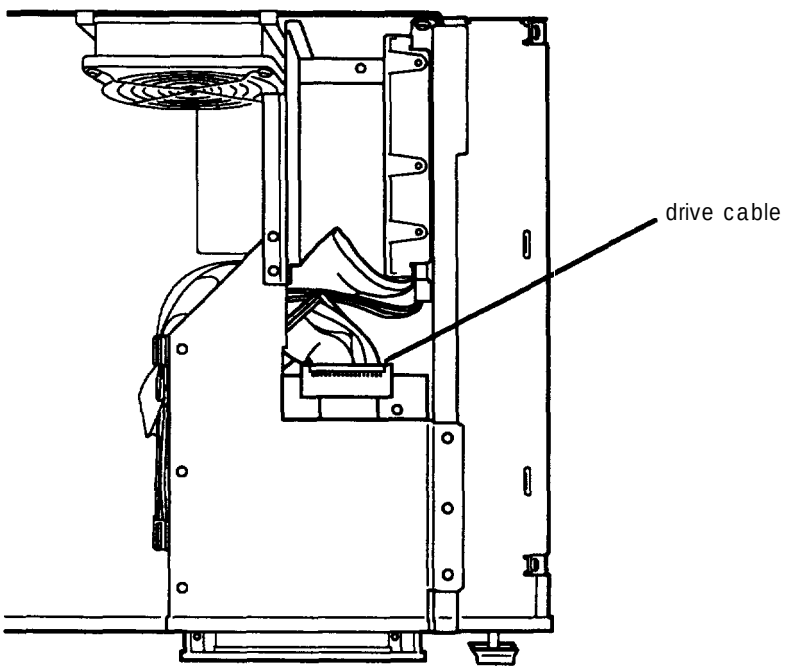
6. **Now adjust the drive's position in the drive bay by pulling it forward or pushing it back along the drive brackets until you are satisfied with its position. A diskette drive (or other externally-accessible device) should extend out of the bay, so its faceplate is flush with the upper diskette drive faceplate. A hard disk drive should fit all the way into the bay. If necessary, replace the front panel (as described in Chapter 2) to check the drive's position.**

7. **When the drive position is correct, remove the nuts securing it to the drive bay and pull it gently out of the bay. Then tighten the four screws on the brackets, slide the drive back into the bay, and replace the two nuts.**

8. **Now follow the steps in the next section to connect the necessary cables to the drive.**

Connecting the Cables

To connect the drive to your computer, you'll attach it to two cables: a power supply cable and a drive ribbon cable. The drive interface and power supply socket are located at the back of the drive. The illustration below shows the drive ribbon cable connected to the interface on the top diskette drive.

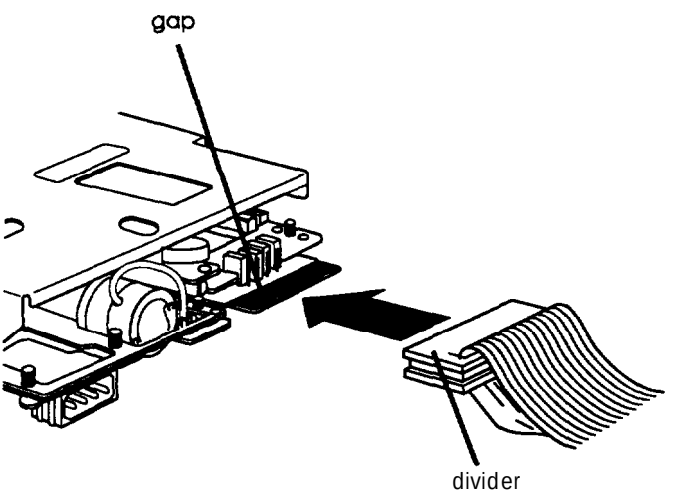


Follow these steps to connect the cables:

1. **If you are installing a diskette or tape drive, go to step 2. If you are installing a hard disk drive, skip to step 3.**

2. **Locate the diskette drive ribbon cable. (One end is connected to the main system board and the other end, labeled FDD 1, is attached to the top diskette drive.) To connect diskette drive B, use the connector labeled FDD 2. To connect a tape drive, use the connector labeled TAPE DRIVE ONLY.**

   The interface extending from the back of the drive has gold contacts on both sides. Align the cable connector with the interface so that the plastic divider on the connector lines up with the gap in the interface, as shown below.

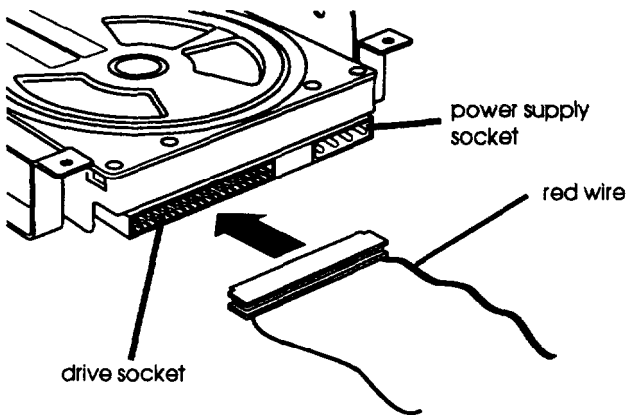


   Make sure the connector fits properly onto the drive interface and then push it into place. Then go to step 4.

> **Caution**
> **If you do not align the connector correctly, you could severely damage your diskette drive when you push it in.**

3. **If you are connecting a hard disk drive, locate the hard disk drive ribbon cable. It is a flat cable with a red wire running down one side. (If you are installing your second drive, one end of the cable is connected to the main system board and another connector is already attached to the hard disk drive in the internal drive bay. Use the free connector for the second drive.)**

   The connector has two rows of holes designed to fit over the pins in the drive socket. The red wire on the cable helps you orient the cable connector to the drive. Align the connector with the socket so the side of the cable with the red wire faces the power supply socket on the drive.

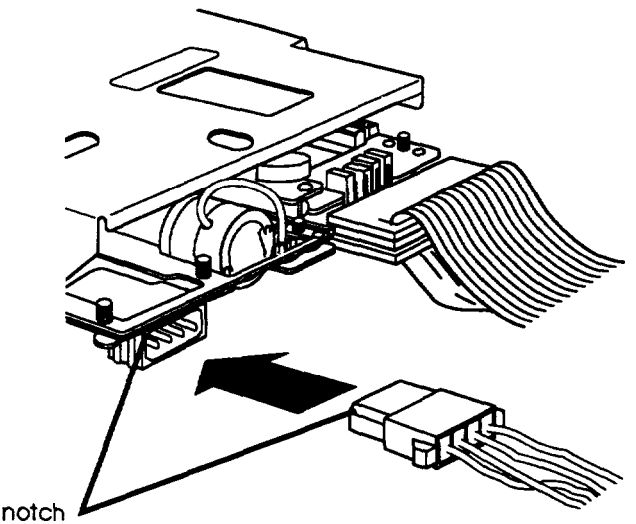


   Make sure the holes fit over all the pins and then push in *the* **Connector.**

> **Caution**
> If you do not correctly align the holes with the pins, you could severely damage your drive when you push in the connector.

4. Locate one of the five power supply cables secured by the clasps on the side of the subassembly. The cables are labeled P1 through P5; you can use any one of them.

   Position the cable connector so its notched corners line up with the notched comers of the power supply socket on your drive, as shown below.



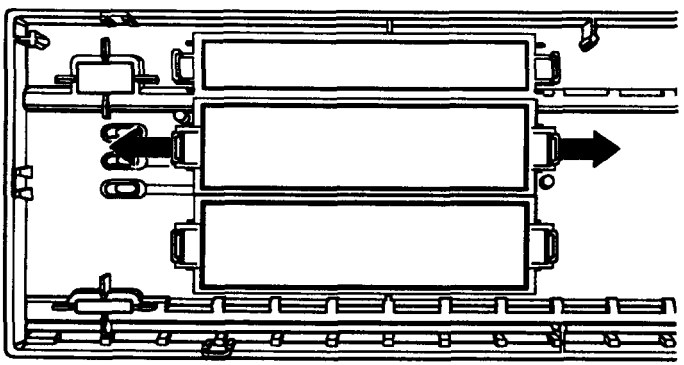
   (This illustration shows a diskette drive. The power supply connector is the same on a hard disk drive.)

5. Make sure the holes in the connector fit over all the pins in the socket and then push in the connector.

> **Caution**
> If you do not align the connector correctly, you could severely damage your drive when you push it in.

6. **If you installed a hard disk drive, skip to step 7.**

   If you installed a diskette drive, tape drive, or other accessible drive, you need to remove the slot cover for that drive from the front panel. Turn the front panel so you are looking at the inside. Press outward on the slot cover tabs, as shown below, and pop out the cover. (Store the slot cover in a safe place in case you want to reinstall it later.)

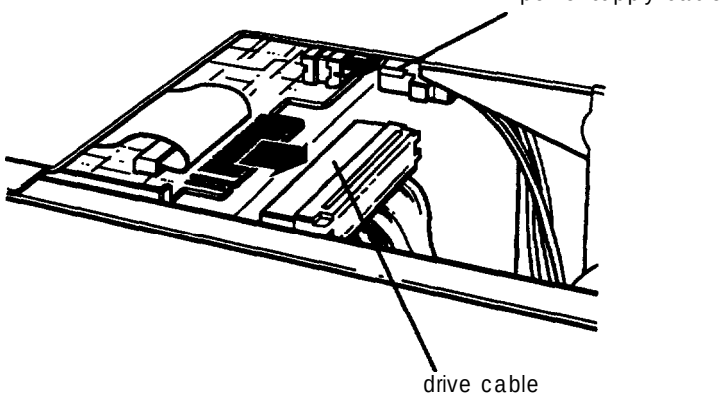


7. **Replace the computer's front panel and cover as described in Chapter 2; then see "Post-installation Procedures" on page 4-27 to update your configuration.**

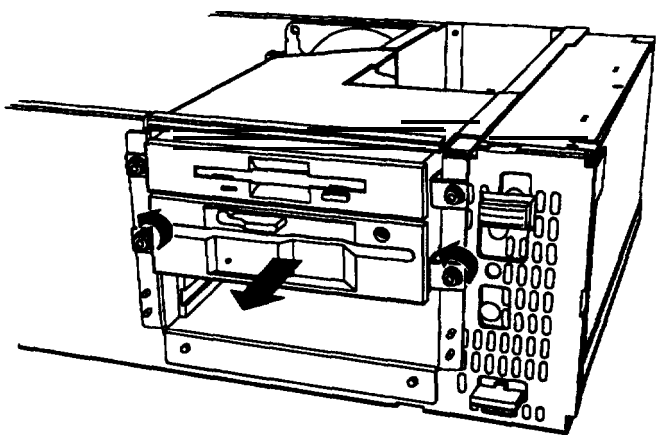
Removing a Drive From the External Bay

Follow these steps to remove a drive from the external bay:

1. **Disconnect the power supply and drive cables from the back of the drive you want to remove, as shown below.**



2. **Use the small wrench that came with your computer to remove the two nuts securing the drive brackets to the front of the drive bay.**

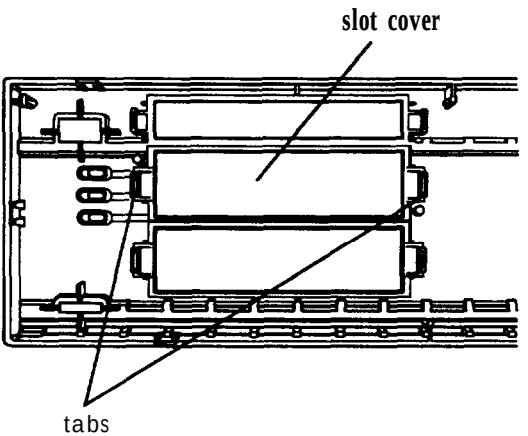


3. **Grasp the front of the drive and pull it out of the bay.**

> **Note**
> **If you removed an IDE hard disk drive from the external bay and it is your only hard disk drive, you must also remove the hard disk drive cable from its connector on the main system board. First remove the cable from the clasps on the side of the subassembly. Then disconnect the cable from the main system board and remove it from the computer. (See the illustration on page 4-21 to locate the main system board connector.)**

4. **If you removed a hard disk drive, go to step 5.**

   If the drive you removed was accessible from the front of the computer, you need to reinstall the front panel slot cover. Turn the front panel so you are looking at the inside. Then press the slot cover into the slot until it clicks into place between the tabs on both sides of the opening.

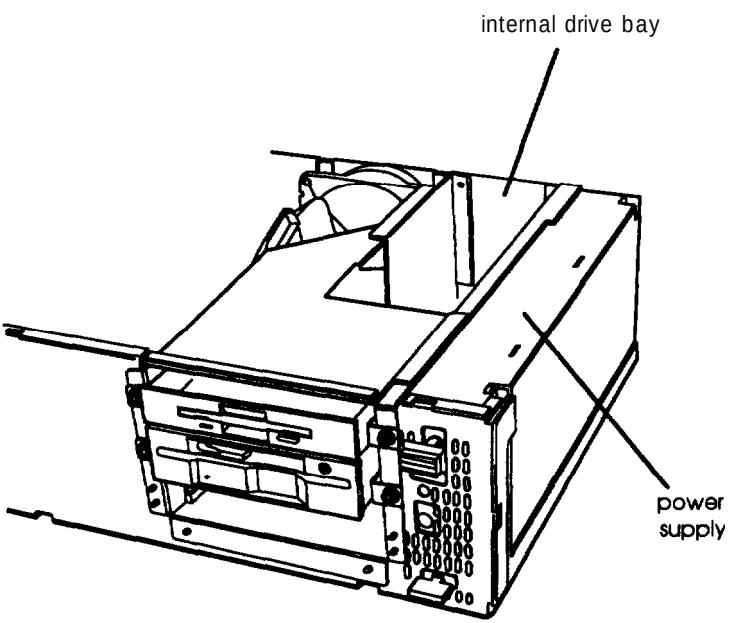


5. **Replace the computer's front panel and cover as described in Chapter 2; then see 'Post-installation Procedures" on page 4-27 to update your configuration.**

Installing a Hard Disk Drive in the Internal Bay

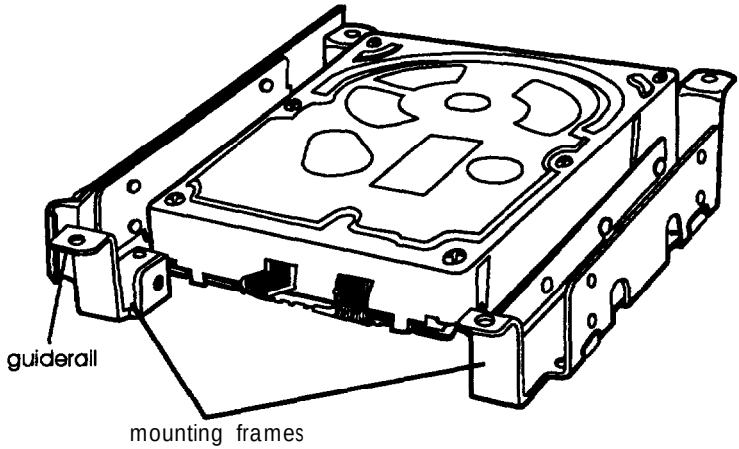
Before you install a hard disk drive in the internal drive bay, read the following guidelines:

- **The internal drive bay can accommodate only half- or full-height hard disk drives that are 3 ½ inches wide. If you are installing your first half-height hard disk drive, install it in the position farthest from the power supply.**
- **If you want to install a full-height hard disk drive, you first need to remove any half-height drive installed in the internal drive bay. See "Removing a Hard Disk Drive From the Internal Bay" on page 4-25.**
- **If you are installing or removing a hard disk drive in the position next to the power supply, first remove the subassembly as described in Chapter 2.**

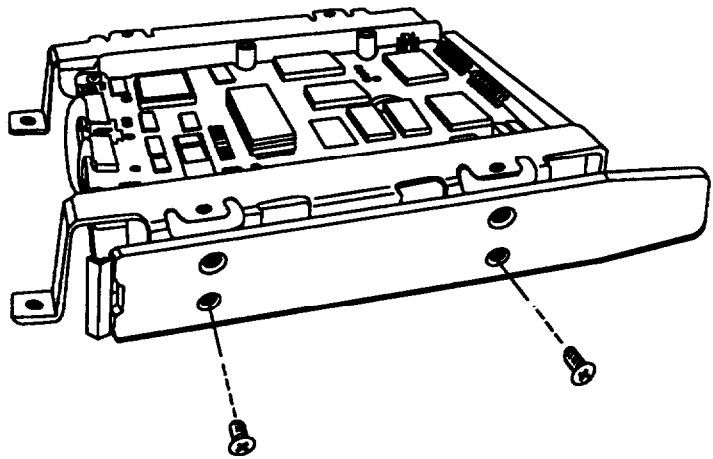


Follow these steps to install a new hard disk drive (or reinstall a drive you removed) in the internal bay:

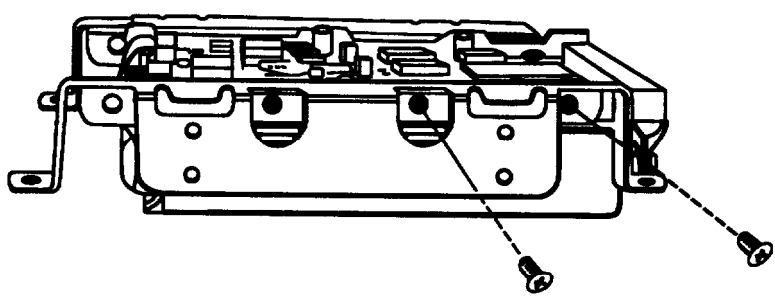
1. **Your hard disk drive may have come with mounting frames attached to each side of the drive, as shown below. On one side, there may also be a plastic guiderail. (If your drive came without frames or a plastic guiderail, skip to step 3.)**



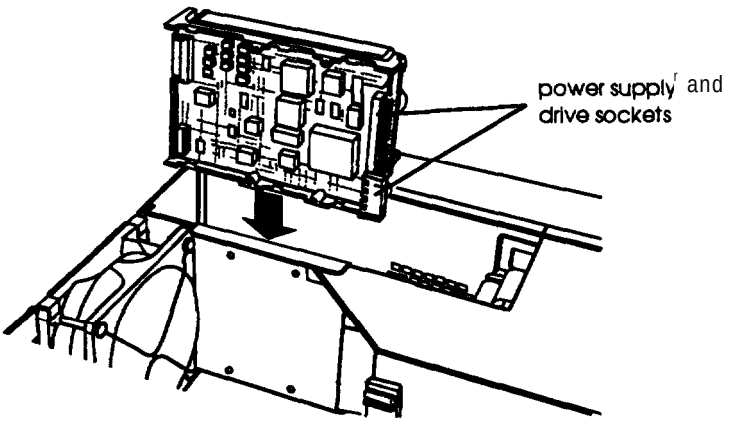
If a plastic guiderail is attached, remove the screws securing the guiderail and the metal grounding plate to one of the mounting frames, as shown below.



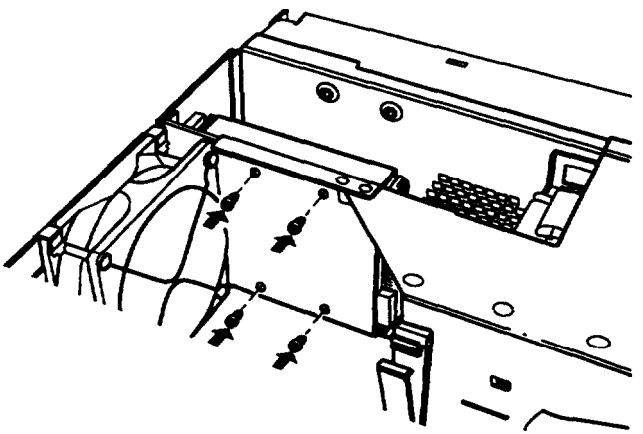
2. Remove the two screws securing the mounting frames to each side of the drive.



3. **Position the drive above the drive bay, as shown below. Make sure the power supply and drive sockets face the front of the subassembly. Then lower the drive into the bay.**



4. **Adjust the drive's position so the four holes on the drive are aligned with the corresponding holes in the drive bay. Then secure the drive with the four screws that came with it.**



5. **Now connect the drive and power supply cables, as described in the next section.**

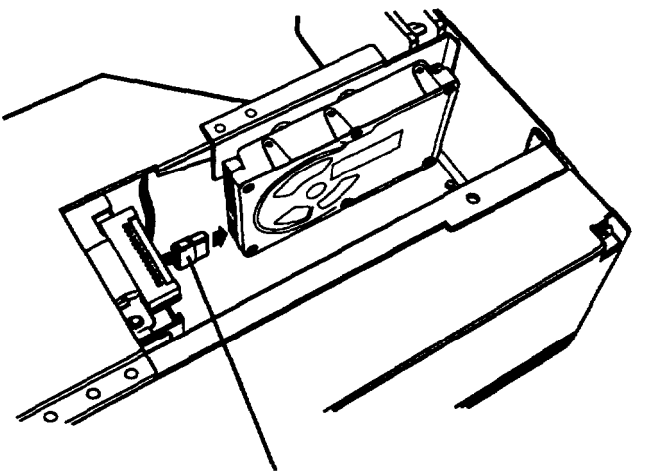
Connecting the Cables

To connect the drive to the computer, you'll attach it to two cables: a power supply cable and a drive ribbon cable. Follow these steps to connect the cables:

1. **If the subassembly is out of the computer, follow the steps in Chapter 2 to replace it.**

2. **Locate one power supply cable for each drive you installed in the internal drive bay. (The five cables may be secured in the clasps on the side of the subassembly.) You can use any of the free cables labeled P1 through P5.**

3. **Position the cable connector so its notched comers line up with the notched comers of the power supply socket on your drive, as shown below. Make sure the holes fit over all the pins and then push in the connector.**



power supply cable

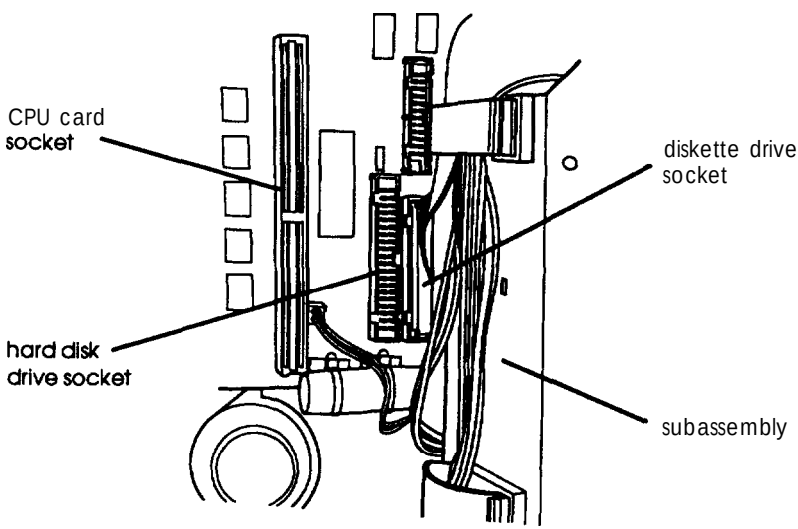
Caution
If you do not align the connector correctly, you could severely damage your drive when you push it in.

4. **If the drive you installed is the second hard disk drive (there was already one installed), go to step 7.**

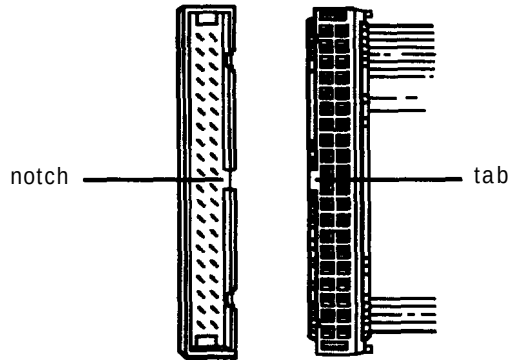
   If the drive you installed is the only hard disk drive, you need to attach the hard disk drive ribbon cable to the main system board. This flat cable came in the box with your computer. It has three connectors: one on each end and one in the middle, as shown below.

   Locate this cable before you go to the next step.

5. **The hard disk drive socket is located between the subassembly and the CPU card socket on the main system board, as shown below. (For clarity, the CPU card does not appear in the illustration.)**



To attach the cable to the main system board, select a connector on one end of the cable. Align the small tab in the middle of the connector with the notch on the socket, as shown below.

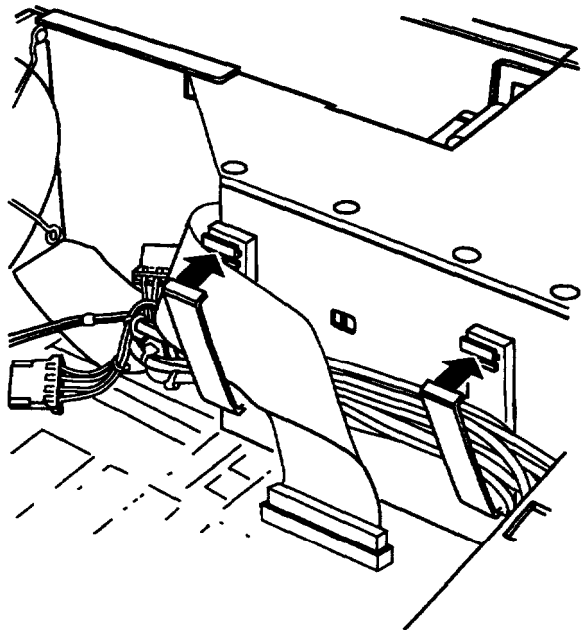


(If you need to connect the diskette drive cable to the main system board as well, use the connector with a tab on one end of the cable and insert it as described above.)

If you have difficulty reaching the socket, you can remove the CPU card as described in Chapter 3; just be sure to reinstall it before you go on to step 6.

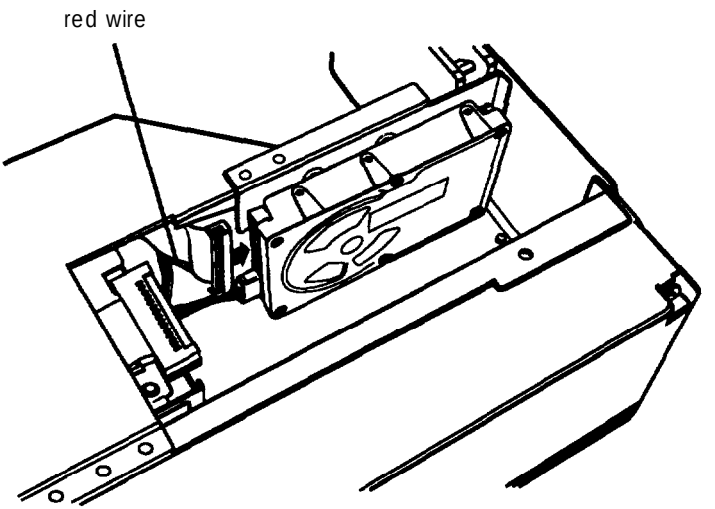
Make sure the holes in the connector fit over all the pins in the socket; then push in the connector.

6. **Thread the cable through the rear clasp on the side of the subassembly, as shown below. (You may have to fold the cable as shown.) Then snap the clasp shut.**



7. **Now you can attach the hard disk drive cable to your drive. If only one hard disk drive is installed, you can use either of the two free connectors on the cable. If you just installed the second hard disk drive, use the remaining free connector.**

The connector has two rows of holes designed to fit over the pins in the drive socket. Notice the red wire running down one side of the cable. This wire helps you orient the cable connector to the drive socket. Align the connector with the socket so the side of the cable with the the red wire faces the drive's power supply socket, as shown below.



Make sure the holes in the connector fit over all the pins in the socket; then push in the connector.

> **Caution**
> If you do not correctly align the holes with the pins, you could severely damage your drive when you push in the connector.

8. **If you removed the subassembly earlier, follow the steps in Chapter 2 to replace it in your computer.**

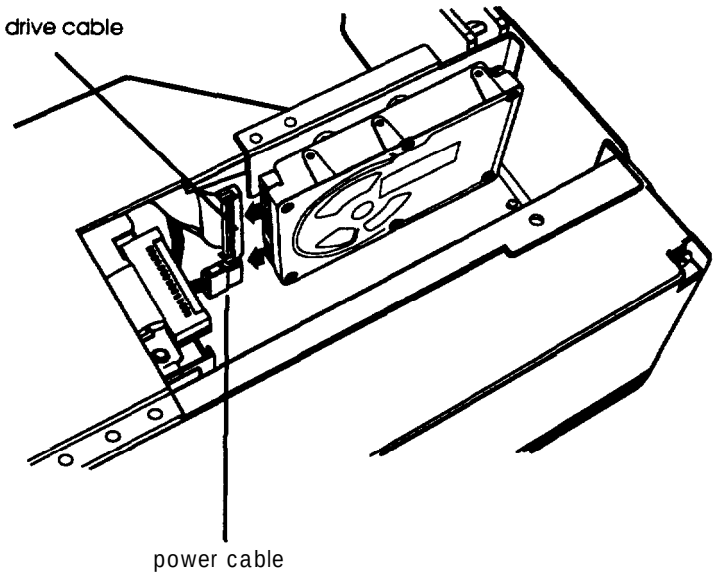
9. **Replace the computer's cover as described in Chapter 2; then see "Post-installation Procedures" at the end of this chapter to update your configuration.**

Removing a Hard *Disk Drive From the Internal Buy*

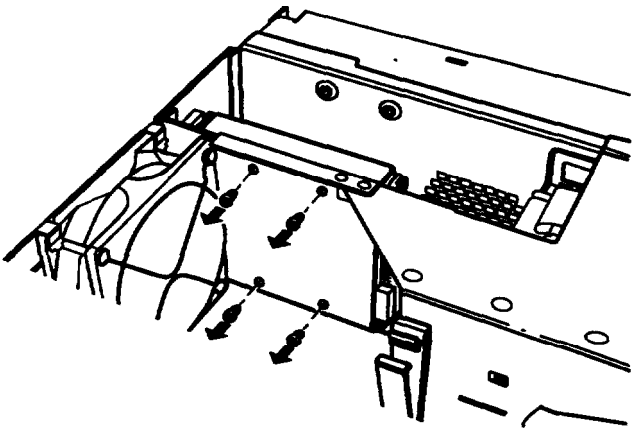
Follow these steps to remove a hard disk drive from the internal drive bay:

1. **If you are removing a hard disk drive in the position next to the power supply, first remove the subassembly as described in Chapter 2**

2. **Disconnect the power supply and drive cables from the drive, as shown below. (If the subassembly is out of the computer, you may have already disconnected these cables.)**



3. **Remove the four screws securing the drive to the internal drive bay. Then lift the drive out of the bay and set it aside.**



> **Note**
> **If you removed one IDE hard disk drive and are leaving another one in the system, you must set the jumpers on the remaining drive to indicate that you have only one IDE drive installed. Remove the other drive following steps 2 and 3, above; then see page 4-4 and the documentation that came with your hard disk drive for instructions on setting the jumpers.**

4. **If you removed your only IDE hard disk drive, you need to remove the hard disk drive cable from the connector on the main system board. First remove the cable from the clasps on the side of the subassembly. Then disconnect the cable from the main system board connector. (gee the illustration on page 4-21 to locate the connector.)**

   If you removed the subassembly to perform any of the steps above, follow the instructions in Chapter 2 to replace the subassembly in the computer.

5. **Replace the computer's cover as described in Chapter 2; then see "Post-installation Procedures," below, to update your configuration.**

Post-installation Procedures

After you install or remove a drive, follow the necessary steps below to make sure your new configuration works properly:

1. **Run the SETUP program to configure your computer for your new drive configuration. See Chapter 2 of the Setup Guide for instructions.**

2. **If you installed a hard disk drive that did not receive a low-level format, you need to format the drive before you can use it. (All Epson drives are sold already formatted.) Check the manual that came with the drive to see if it is already formatted. If not, see Chapter 6 for instructions.**

3. **If you want to be able to load your operating system from a new hard disk drive, you need to install it on the drive. See the documentation that came with your operating system for instructions.**

4. **You may also want to test a newly-installed drive. See Chapter 5 for instructions on using the system diagnostic program on your Reference diskette to test your drives.**

Chapter 5
Running System Diagnostics

You can test the following devices using System diagnostics:

- ❑ **Systemboard**
- ❑ **Numeric coprocessor**
- ❑ **System memory**
- ❑ **Diskette drive(s)**
- ❑ **Hard disk drive(s)**
- ❑ **serial port(s)**
- ❑ **Parallel port(s)**
- ❑ **Video adapter**
- ❑ **Dot matrix printer(s).**

See the table on page 5-7 for a list of the tests available for each device.

> **Note**
> **The Write, read checks for the hard disk drive(s) and diskette drive(s) destroy data on the disk. Be sure to back up any data on your hard disk or insert a blank, formatted diskette before you run this test. Also be sure to do this if you select Run all above checks.**

Starting the Program

Follow these steps to start the System diagnostics program:

1. **Insert the Reference diskette in drive A and turn on or reset the computer.**

> **Note**
> **Always boot the computer from the Reference diskette to start System diagnostics. This clears any terminate-and-stay-resident (TSR) programs or other utilities from memory and frees it for use by the diagnostics program.**

2. **At the** A: **prompt, type** `DIAG` **and press** Enter.

3. **You see a menu bar at the top of the screen with Items Detected highlighted. Press** Enter.

4. **You see a list of all the testable devices the computer detects in your system. Check to be sure the list is correct.**

5. **If the list is not correct, press** → **to select Quit and press** Enter. **Run the SETUP program to make sure any missing devices are configured properly. (See Chapter 2 of the** *Setup Guide* **for instructions.) Then run System diagnostics again beginning at step 1.**

   When the list is correct, you can run diagnostic tests on each device. If you do not want to test a device, you can remove it from the list. You can also add a device to the list.

Deleting Tests

To remove devices from the Items Detected list so the System diagnostics program cannot test them, follow these steps:

1. **Press → to select Delete Tests. You see the Delete menu, such as the following:**

   System Board
   Numeric Coprocessor
   system Memory
   Diskette Drive A
   Hard Disk Drive #1
   Serial Port COM1
   Parallel Port LPT1
   Video Adapter Test

2. **Press ↓ or ↑ to highlight the device you want to delete and press Enter. The device is removed from the Delete menu. You can delete as many devices as you want.**

3. **When you are finished deleting devices, press ← to select Execute and see "Running Tests" below.**

Adding Tests

If you want to add devices to the Items Detected list, follow these steps:

1. **Press ← or → to select Add Tests. You see the Add menu, such as the following:**

   ```
   Diskette Drive B
   Hard Disk Drive #2
   Serial Port COM2
   Parallel Port LPT2
   LPT1 Printer Test
   LPT2 Printer Test
   ```

   The Add menu lists the testable devices that the computer has not detected as Enabled in your system. You also see any devices that you deleted from the Delete menu in case you want to be able to test them.

2. **Press ↓ or ↑ to highlight the device you want to** add **and press Enter. The device is removed from the Add menu and added to the Items Detected list. You can add as many devices as you want.**

3. **When you are finished adding devices, press ← to select Execute and see the next section.**

Follow these steps to run a test from the Execute menu:

1. **Press [←] or [→] to select Execute. You see the Execute menu, such as the following:**

```
System Board
Numeric Coprocessor
System Memory
Diskette Drive A
Hard Disk Drive #1
Serial Port COM1
Parallel Port LPT1
Video Adapter Test
```

2. **Press [↑] or [↓] to highlight the device you want to test and press [Enter]. You see the Repeat prompt:**

```
How often to repeat test? 1
```

3. **If you want to run the test once, press [Enter]. To run the test more than once, type the number of times you want to run it and press [Enter].**

4. **If there is only one test for a device, the program begins testing immediately. If there is more than one test for the device, you see a submenu, such as the following:**

```
HARD DISK DRIVE(S) AND CONTROLLER
CHECK MENU

1 - Seek check
2 - Write, read check
3 - Read, verify check
4 - Run all above checks
0 - Exit
```

Use [↑] or [↓] or type the number of the desired option to highlight a test and then press [Enter] to run it.

> **Note**
> If you selected to run the tests more than once, you do not see a submenu. The program immediately begins executing all the tests that do not destroy data.

5. When the test is completed, you see the Execute menu or the test submenu again. You can select another test or exit the menu.

   To exit System diagnostics, press [→] to select Quit and press [Enter]. You return to the operating system command prompt.

Resuming From an Error

If an error prevents a test from running, you see a Runtime Error information box. Follow the instructions on the screen to solve the problem.

If an error occurs during a test, the test stops and an error message appears. Follow the instructions on the screen to print the message or to continue without printing it.

For a complete list of the error messages the program may display, see the table at the end of this chapter.

System Diagnostic Tests

The table below lists all the System diagnostic tests you can run on your system.

System diagnostic tests

Device	Tests available	Description
System Board		Checks the system board components
Numeric Coprocessor		Tests the operation of any built-in or optional math coprocessor
System Memory		Checks all memory and displays a memory count
Diskette Drive(s) A or B	Sequential seek check Random seek check Write, read check • Disk change check Run all above checks	Tests the operation of the selected diskette drive: requires a formatted diskette for some tests
Hard Disk Drive(s) # 1 or #2	Seek check Write. read check • Read, verify check Run all above checks	Tests the operation of the selected hard disk drive
Serial Port(s) COM1 or COM2		Tests the selected serial port; requires a loop-back connector (contact your dealer)
Parallel Port(s) LPT1 or LPT2		Tests the selected parallel port; requires a loop-back connector (contact your dealer)

System diagnostic tests (continued)

Device	Tests available	Description
Video Adapter	Adapter check Attribute check Character set check Graphics mode check Screen paging check Sync check Run all above checks	Tests the operation of the built-in VGA display adapter
LPT1 or LPT2 Printer Test(s)		Tests the operation of the selected dot matrix printer and prints a test pattern

* The Write, read check destroys data on the disk. Be sure to back up data on a hard disk or insert a blank, formatted diskette before running this test.

Error Messages

The following table lists all the error messages that may appear during System diagnostic testing.

System diagnostic error messages

Error code	Message
System board	
0101	CPU error
0102	ROM checksum error
0103	Timer counter register error
0104	Timer counter error
0105	Refresh error
0105	DMA controller register error
0106	DMA page register error
0107	Refresh error
0108	Keyboard controller timeout error
0108	Keyboard controller self diagnostic error
0108	Keyboard controller write command error
0109	CMOS checksum error
0110	CMOS shutdown byte error
0111	CPU Instruction error

System diagnostic error messages (continued)

Error code	Message
System board	
0112	CMOS battery error
0113	Interrupt controller error
0114	Protect mode error 1
0115	Protect mode error 2
Memory	
0201	Memory error
0201	Parity error
Diskette drive(s)	
0601	Diskette drive controller error
0602	Sequential seek error
0603	Random seek error
0604	Write error
0605	Read error
0606	Remove error
0607	Insert error
Coprocessor	
0701	Coprocessor not installed
0702	Coprocessor initialize error
0703	Coprocessor invalid operation mask error
0704	Coprocessor st field error
0705	Coprocessor comparison error
0706	Coprocessor zero divide mask error
0707	Coprocessor addition error
0708	Coprocessor subtraction error
0709	Coprocessor multiplication error
0710	Coprocessor precision error
Parallel port(s)	
0901	Error pin p
Serial port(s)	
1101	control signal always low
1101	control signal always high
1102	Timeout error
1103	Verity error
Hard disk drive(s)	
1701	Seek error
1702	Write error
1703	Read error

Chapter 6
Formatting a Hard Disk

This chapter describes how to low-level (or physically) format a hard disk. This procedure should not be confused with the logical format performed by your operating system. The physical formatting of a hard disk is a separate step that is usually done at the factory by the disk manufacturer.

If your computer came with a factory-installed hard disk, or if you installed an optional Epson IDE hard disk, it has already been physically formatted. You need only follow the instructions in your operating system manual to prepare your hard disk for use.

You may need to use the procedure in this chapter to physically format a hard disk if you installed a non-Epson hard disk in your computer that has never received the low-level format and did not come with its own format utility. If you installed a hard disk that came with its own format utility, use that program to physically format the disk.

> **Caution**
> **If you are unsure whether formatting is necessary, contact your Epson dealer for assistance.**

Physically formatting a hard disk erases any data it contains. Be sure to back up any data on your hard disk before you format it.

In addition to destroying all the data on the hard disk, formatting removes any partitions and logical formatting defined on the disk by your operating system. After you physically format a new or used hard disk, you need to logically format the disk again using your operating system.

Note

Sometimes, after a hard disk has been used for a long time, its data becomes fragmented, causing the disk to perform less efficiently or produce errors. If this happens, check your operating system manual for procedures you can perform to reorganize your data on the hard disk. If those procedures (or a commercial defragmenting utility) do not solve the problem, you may want to reformat the disk by following the instructions in this chapter.

Starting the Program

Follow these steps to start the hard disk formatting program:

1. **Insert the Reference diskette in drive A and log onto drive A.**
2. **Type HDFMTALL and press Enter.**

   You see the Hard Disk Format Menu:

   ```
   1 - Format
   2 - Destructive surface analysis
   3 - Non-destructive surface analysis

   0 - Exit
   ```

   The option you choose depends on whether you are formatting a new disk or reformatting a used disk. The options work as follows:

   - **Format first scans the disk for defective (bad) tracks (if it has no defective track table) and lets you decide which tracks to mark as bad. Then it formats the disk and marks the bad tracks so they are never used to store data.**

- **Destructive surface analysis tests the entire disk for read/write errors or unflagged bad tracks and updates the defective track table. Because this option writes and reads data on the disk, it destroys all data on any track that produces an error. You cannot run this test** *on a disk that has never been formatted*

- **Non-destructive surface analysis checksthe disk for unflagged bad tracks without destroying data. You** *cannot run this test on a disk that has never been fatted.*

Formatting a New Disk

To format a new hard disk that has never been formatted, select the Format option. You may need to modify the defective track table to add bad tracks when you format the disk. Many hard disk drives come with a printed list of bad tracks, but the bad tracks are not flagged on the disk. Other hard disks (such as Epson disks) come with the bad tracks already flagged.

Reformatting a Used Disk

To reformat a disk you have been using follow these steps:

1. **Use the Nondestructive surface analysis option to check for unflagged bad tracks.**

2. **If errors occur during the Nondestructive surface analysis, back up your hard disk to diskettes.**

3. **Run the Destructive surface analysis option to update the defective track table.**

4. **Run the Format option to format the disk.**

selecting an Option

When you use this program, you often need to select an option from a menu. There are two ways to do this:

- **Use the arrow keys ([↑], [↓], [←], [→]) to highlight the option and press [Enter]**
- **Type the number of the option and press [Enter].**

You can select almost any option that appears on the screen using either method.

selecting a Drive

If you have more than one hard disk drive, you see this prompt:

```
Enter drive number ? (1/2)
```

Select 1 for the first hard disk or *2* for the second hard disk. Then see the instructions below for the Hard Disk Format Menu option you want to use.

Option 1, Format

If you select Format from the Hard Disk Format Menu, you see the following (for a disk with no defective track table):

```
Format Hard Disk < Drive n: >

Scan hard disk to get defective track
information? (Y/N)
```

(If the disk already has a defective track table, you do not see this because you do not need to scan for bad tracks.)

1. Select Y to scan the disk or N to skip the scanning process.

   If you select Y, the program scans the disk and displays these messages during the process:

   ```
   Scanning for flagged bad tracks...

   Head : nnn Cylinder : nnnnn
   ```

   You see the head and cylinder numbers decrease as the program progresses. After scanning the disk, the program displays the results, such as the following:

   ```
   Scanning finished.
   Count of tracks flagged bad          =    1
   Count of tracks with other errors =    0
   Count of good tracks                 = 4884
   ```

2. Next you see the following prompt:

   ```
   Accept recommended skewed sectors in
   format : 1 1 (Y/N)
   ```

   For an Epson hard disk drive, it is best to accept the recommended skewed sector (also called the interleave factor) of 1, since this setting allows your drive to perform more efficiently. For other hard disk drives, you may need to change this value if the documentation that came with the disk recommends a different number.

   To accept the default, select Y. Then go to step 3.

   To enter a new value, select N. You see the following prompt:

   ```
   Enter new skewed sectors in
   format (1-16):
   ```

   Enter the recommended number, which equals the maximum sector number for the drive minus 1. Then press Enter.

3. **Next you see this prompt:**

   ```
   Accept recommended skewed sectors per
   head in format : 0 ? (Y/N)
   ```

   For an Epson hard disk drive, accept the recommended value of 0. For another type of drive, use the value recommended in the documentation for the drive.

   To accept the default, select Y. Then go to step 4.

   To enter a new value, select N. You see the following prompt:

   ```
   Enter new skewed sectors per head
   in format (0-16):
   ```

   Enter the recommended number, which equals the maximum sector number for the drive minus 1. The maximum sector number varies, depending on the drive type. Then press Enter.

4. **The program now allows you to edit the defective track table. At the bottom of the table is this prompt:**

   ```
   Modify defective track table ? (Y/N)
   ```

   Select N if you want to leave the table as it is. Then skip the next section and go to "Formatting the Disk" on page 6-8.

   To add bad tracks to the defective track table, see the next section.

Modifying the Defective Tack Table

If you select Y **to modify the table, you see the following options at the bottom of the table:**

```
Defective Track Table : Move box cursor to
desired track with cursor key
A = Add track, C = Change track,
D = Delete track, F = Finish editing
Enter command :
```

To add a bad track, follow these steps:

1. **Press** [A]**. You see this prompt:**

   Enter cylinder number (1 - *nnnn*):

2. **Type the number of the** cylinder **containing the bad track and press** [You see this prompt:

   Enter **head number (0 - nn):**

3. **Type the head number for the bad track and press I. (To cancel the operation, press IEnbr) without typing a value.)**

When you complete a valid entry, it appears in the table and you can add the next bad track, if necessary.

If you make a mistake, move the cursor block to the incorrect track and press [cl to change the track data or [D] **to delete the track from the table. Change the track data in the same way as you add a track.**

The maximum valid cylinder number and head number (nnnn and *nn*) vary according to the capacity of the hard disk. If you enter an invalid cylinder or head number, a reminder of the range of values appears and the program asks you to enter the value again.

When you finish adding all the bad tracks, press Enter without typing a value. Then check the entries in the defective track table. When you are sure the table is correct, press F. The program displays a warning about the consequences of proceeding with formatting, as described in the next section.

Formatting the Disk

When you are ready to start formatting the disk, you see the following warning:

```
WARNING! ALL DATA WILL BE DESTROYED IN ALL
PARTITIONS OF HARD DISK, NOT JUST IN MS-DOS
PARTITION!
Do you want to start formatting ? (Y/N)
```

If you are not sure you want to format the hard disk, select N. If you are sure, select Y; the program gives you one more chance to cancel:

```
DOUBLE CHECK THAT YOU HAVE BACKUP DISKETTE
COPIES OF ALL YOUR FILES.
Do you want to exit and check your file
copies ? (Y/N)
```

select Y to Cancel formatting or N to continue.

If you continue with formatting, you see:

```
Format started.

Head : nnn Cylinder : nnnnn
```

You see the head and cylinder numbers decrease as the program progresses.

When formatting is complete, the program flags any bad tracks and you see a series of messages like these:

```
Format finished.
Flagging bad tracks...
Cylinder is nnnn, head is nn
Format completed.
Press ENTER to return to the menu.
```

Press Enter to return to the Hard Disk Format Menu.

Option 2, Destructive Surface Analysis

You can performa Distructive surface analysis of your hard disk to accurately locate any bad tracks and flag them, if they are not flagged. The test writes, reads, and verifies information on every track of the hard disk, except for tracks that are already flagged as bad.

> **Caution**
> If any errors occur during this check, all data on the track that caused the error is destroyed. If you think that an unflagged bad track is causing trouble, first run the Nondestructive surface analysis to check the disk surface.

To start this test, select Destructive surface analysis from the Hard Disk Format Menu. You see these messages:

```
Analyze Hard Disk <Drive II:>

Read/Save/Write/Read/Restore/Read
check for all tracks...

Current cylinder is nnnn
```

As the program checks each track, it decreases the cylinder numbers to zero.

When the test is complete, the program displays a report on the status of the disk, including a table of unflagged tracks that produced write, read errors-such as the following:

```
Analysis finished.

Count of tracks flagged bad              =    n
Count of tracks with write, read errors =    n
Count of good tracks                     = nnnn

No write, read error was detected.

No data was destroyed.

Press ENTER to return to the menu.
```

If the program finds an unflagged bad track, the report is followed by a table like this:

```
Write, Read Error Tracks

Cylinder Head Cylinder Head Cylinder Head Cylinder Head

237   2

Confirm to register the tracks in the Write, Read Error
Track Table as bad tracks.

Do you want to register the error tracks as bad tracks?
(Y/N)
```

To flag these tracks as bad, select Y. **You see a list of the tracks as they are flagged. When the process is complete, press** Enter **to return to the Hard Disk Format Menu.**

Option 3, Non-destructive Surface Analysis

The Nondestructive surface analysis does not destroy any data, and you can use it to safely check the condition of your hard disk drive. However, this test does not flag any bad tracks it detects.

To start the test, select Non-destructive surface analysis from the Hard Disk Format Menu. You see these messages:

```
Analyze Hard Disk <Drive n:>

Read/Verify check for all tracks...

Current cylinder is nnnn
```

As the program checks each track, it decreases the cylinder numbers to zero. When the test is complete, the program displays a report on the status of the disk, such as the following:

```
Analysis finished.

Count of tracks flagged bad              =    n
Count of tracks with read, verify errors =    n
Count of good tracks                     = nnnn

No read, verify error was detected.
```

If the program finds errors, the screen displays a table of the tracks that produced the errors. Then you see this message:

```
Press ENTER to return to the menu.
```

Check the information displayed. Then press Enter to return to the Hard Disk Format Menu.

Exiting the Program

To leave the Hard Disk Format Menu, select Exit. You see the operating system command prompt.

If you formatted the hard disk or ran the Destructive surface analysis option, you must now prepare your hard disk for use with your operating system. See your operating system manual for instructions.

Chapter 7
Troubleshooting

You should not encounter any difficulties as you set up and use your computer, but if anything out of the ordinary happens, refer to this chapter. You can correct most problems by adjusting a cable connection, repeating a software procedure, or resetting the computer.

Besides trying the suggestions in this chapter, you can run diagnostic checks on the various components of your system. See Chapter 5 for instructions. If the suggestions here or in Chapter 5 do not solve the problem, see "Where to Get Help" in the Introduction.

Identifying Your System

When you request technical assistance, be ready to provide the serial number of your computer, its ROM BIOS version number, its configuration (including the type of disk drives, monitor, and option cards), and the names and version numbers of any software programs you are using.

You may have recorded this information on the *Read This First* **card that came with your system. If not, you can find the computer's serial number on its back panel. If you are able to use your computer, follow the steps below to obtain information about your configuration, as well as your ROM BIOS and MS-DOS (or other operating system) version number.**

1. **If you do not have a hard disk, insert your main operating system diskette in drive A.**

2. **Turn on or reset your computer.**

3. **When the computer performs its power-on memory test, the version numbers of your VGA BIOS and system BIOS appear at the top of the screen. Quickly write down the version numbers. If you do not have enough time to do this, press the RESET button and try again.**

4. **When you see Press <F2> to run SETUP, press F2. Write down the necessary configuration information shown on the SETUP screens; then exit SETUP without changing your configuration. (See Chapter 2 of the *Setup Guide* for instructions.)**

5. **If you are using MS-DOS, at the command prompt type VER and press Enter. The screen displays the MS-DOS version number. Write it down. (If you are using another operating system, see the manuals that came with it for instructions on obtaining the version number.)**

Error Messages

Your computer's built-in memory (ROM) contains a series of diagnostics programs, called power-on diagnostics, which your computer runs automatically every time you turn it on. These programs check internal devices such as ROM, RAM, the timer, the keyboard controller, and the hard disk drive.

The RAM test program displays the total amount of memory currently installed in your system. If the computer finds an error, it displays an error message on the screen.

If the error is not serious, you see this prompt:

```
Resume = <F1> key
```

Write down the error message and press F1 to continue.

If the error is serious, the computer cancels further checking and halts system initialization. The error message remains on the screen and the computer locks up. If this happens, contact your dealer as soon as possible. Report any error messages when you request technical assistance.

The following table lists all the error messages that may appear during power-on diagnostics. If you receive an error message, look it up in the table below; it directs you to the proper troubleshooting section in this chapter or offers a solution. If you do not see an error message, read the section that covers your problem.

Power-on diagnostics error message

Error code	Message	Action
system board		
101	Primary/secondary Interrupt controller failure	Contact dealer
102	Timer 0 failure	
103	Timer 0 Interrupt failure	
105	Keyboard Input buffer full	
106	I/O port word access error	
107	NMI failure	
108	Timer 2 failure	
Real-time clock		
161	System options not set	Run SETUP; see Chapter 2 of the Setup Guide
162	System options not set	
163	Time and date not set	
164	Memory size error	

Power-on diagnostics error messages (continued)

Error code	message	Action
Shadow RAM and Cache		
171	BIOS shadow RAM error	Contact dealer
173	Cache options error	Run SETUP: see Chapter 2 of the Setup Guide
Memory		
201	Memory error	Contact dealer
202	RAM memory error	
203	Memory address error	
Keyboard		
301	Keyboard error	Bee 'Keyboard Problems'
303	Keyboard or system unit error	
304	Keyboard or system unit error	
Monitor		
401	Monochrome CRT error	See 'Monitor Problems'
501	Color CRT error	
Diskette drive(s) and controller		
601	Diskette error	See 'Diskette Problems' or 'Diskette Drive Problems'
Parallel port		
901	Parallel port error	See 'Printer Problems'
Serial port		
1101	Serial port error	See 'Printer Problems'

Power-on diagnostics error messages (continued)

Error code	Message	Action
Hard disk drive(s) and controller		
1760	Disk 0 parameter failure	See 'Hard Disk Drive Problems*
1761	Disk 1 parameter failure	
1770	Disk 0 parameter error	
1771	Disk 1 parameter error	
1780	Disk 0 failure	
1781	Disk 1 failure	
1782	Disk controller failure	
1790	Disk 0 error	
1791	Disk 1 error	
Auxiliary device(s)		
8601	Auxiliary device failure	See 'Mouse Problems'
8602	Auxiliary device reset failure	
8603	Auxiliary device interrupt failure	

The Computer Won't Start

If your computer does not start when you turn on the power, check the following:

1. **Is the power light on? If not, remove any diskettes and turn off the power. Make sure the power cord is securely connected to both the AC inlet on the back panel and an electrical outlet. Replace your main operating system diskette, if necessary, and turn on the computer again.**

Caution
If you turn off the computer, always wait at least 10 seconds before turning it back on. This prevents damage to the computer's electrical circuitry.

2. **If the power light still does not come on, check the electrical outlet for power. Turn off your computer, unplug the power cord, and plug a lamp into the outlet. Turn it on to see if the outlet supplies power.**

3. **If you installed or removed, any of your system components, such as a disk drive, check to make sure you have reconnected all the internal and external cables correctly. See Chapters 3 and 4 for instructions.**

4. **If the electrical outlet is working and all the connections are secure but your computer still won't start, call your dealer.**

Note
If the computer starts but you can't see anything on the screen, see "Monitor Problems," on page 7-12.

The Computer Does Not Respond

If your computer locks up and does not respond when you type on the keyboard, follow these steps:

1. **Wait a few moments; some operations take longer than others to complete. For example, the computer takes longer to sort a database than to display the time. If your computer still does not respond after a reasonable length of time, proceed to the next step.**

2. If you have just made a change in your system configuration, your computer may take a few minutes to complete its power-on diagnostics. The first time you turn on your computer after making such a change, it can take several minutes to finish its self test, depending on what you changed. If the computer does not display the operating system prompt after five minutes, press the RESET button and try again. If that doesn't work, insert your main operating system diskette in drive A and press the RESET button. If the computer still does not boot, contact your Epson dealer.

3. Did you enter the correct password? See "Password Problems," below.

4. Could your software be causing the problem? If you are running an application program, see "Software Problems," later in this chapter.

5. The problem could be caused by your keyboard. See "Keyboard Problems," later in this chapter.

6. If you want to stop whatever the computer is doing and return to the MS-DOS command prompt, hold down the Ctrl key and press Break (or press C). See Chapter 1 for more information on stopping a command or program.

7. If your computer still does not respond, you can reset it using the Ctrl Alt Delete command or the RESET button. See "Resetting Your Computer" in Chapter 1 for more information.

8. If resetting the computer does not work, turn off the computer and wait at least 10 seconds. If you do not have a hard disk drive, insert your main operating system diskette in drive A; then turn on the computer. It should load the operating system.

9. **If you installed a display adapter card (and did not connect it to the feature connector on the main system board), you must set jumper JP7 to disable the built-in VGA adapter. Otherwise, you will not see any display on the screen. You may also need to change the setting of jumper JP5. See "Jumper Settings" in Chapter 3 for instructions.**

10. **If your computer suddenly stops operating, its power supply thermal detection circuits may have detected excessive operating temperatures and automatically shut down the power. This protects your system from damage.**

    When these circuits detect a high temperature, they shut off all the DC outputs in the power supply and cause it to go into *latch-off* state. This does not damage the power supply, but you must correct the temperature problem before you can use your computer again. See "Restoring the Power Supply," below.

Restoring the Power Supply

To restore normal power supply operation, follow these steps:

1. **Turn off the computer and leave it off for at least 30 seconds to reset the power supply logic.**

2. **To determine the cause of the high temperature and correct the condition, check for the following:**

   - **Room temperature above 95°F (35°C). If this is the case, relocate the computer to a cooler area.**

   - **A blocked power supply fan. Make sure there is space around the power supply fan vents in the back and sides of the computer case. Remove the computer's cover and check both inside and outside the computer for blockage. Make sure there is ample room around your system for air circulation.**

- **An overload of the power supply limitations. Check the table in Appendix A to see if you have exceeded the option slot power limits. See your option card manual(s) for the power requirements for your option card(s).**

3. **After you correct the problem causing the overheating, allow the computer to cool down for at least five minutes at room temperature (about 78°F or 25°C). This resets the thermal detection circuits.**

4. **If you removed the computer's cover, replace it now. (See Chapter 2 for instructions.) Then turn on the computer.**

If the power supply shuts off again, contact your dealer.

Password Problems

If you have any trouble using your password, try the following:

1. **If you think you know the correct password, reset the computer and try again. See Chapter 1 for instructions.**

2. **If you enabled network server mode when you set a password, you may not see the key prompt. For more information, see "Using Your Computer as a Network Server" in Chapter 1.**

3. **If you know the current password but you want to change or delete it, see Chapter 1 for instructions.**

4. **If you do not know the current password and you cannot access your computer, see the next section.**

If you have forgotten your current password, follow these steps to access your system:

1. **Turn off the computer.**
2. **Follow the instructions under "Jumper Settings" in Chapter 3 to disable the password function by setting jumper JP6 to position A.**
3. **Turn on the computer.**
4. **When you see Press <F2> to run SETUP, press F2.**
5. **You see the SETUP screen. If you do not want to set a new password, go to step 7. If you want to set a new password, go to step 6.**
6. **To set a new password, highlight Password and press Enter. Then press F2. Type a new password at the prompt and press Enter. You must enter the new password twice. (See Chapter 2 of the *Setup Guide* for more information about setting a password.) Now go to step 8.**
7. **To disable password checking, highlight Password security and press Enter. Then press + or - to change the setting to Not installed. (See Chapter 2 of the *Setup Guide* for more information.)**
8. **Save your settings as you exit SETUP. (See Chapter 2 of the *Setup Guide* for instructions.)**
9. **Turn off the computer.**
10. **Follow the instructions under "Jumper Settings" in Chapter 3 to enable the password function by setting jumper JP6 to position B.**

11. If you do not have a hard disk, insert your main operating system diskette in drive A. Turn on the computer.

    If you disabled password security, you do not see the key prompt and can access your computer immediately.

    If you set a new password, you see the key prompt (O-MI). (If you enabled network server mode, you may not see this prompt.) Enter your password as described in Chapter 1.

Keyboard Problems

If you have trouble with the keyboard, check the following:

1. If the screen displays a keyboard error message when you turn on or reset the computer, make sure the keyboard is securely connected to the correct port. See "Connecting the Keyboard" in Chapter 1 of the Setup Guide for instructions.

2. If nothing happens when you type on the keyboard, see "The Computer Does Not Respond," above.

3. If the cursor keys do not work properly, the num lock function may be on. When num lock is on, the keys on the numeric keypad work only as numbers. If the Num Lock light in the upper right comer of the keyboard is lit, press [Num Lock] to turn off the function.

   If you want to change the initial setting of the num lock function, see "Setting the Keyboard Options" in Chapter 2 of the Setup Guide.

Monitor Problems

For monitor problems, check the following:

1. **If there is no display on the screen, check that the monitor's power switch is on and that its power light is lit. If the power light is on but you still do not see anything on the screen, check the brightness and contrast controls.**

2. **If the power switch is on but the power light is not, turn off the monitor's power, wait five seconds, and turn it back on. Wait to see if the screen displays any text.**

3. **If the monitor's power light still does not come on, check the electrical outlet for power. Turn off your monitor and unplug it from the outlet. Then plug a lamp into the wall outlet and turn it on to see if the outlet supplies power.**

4. **If you still do not see anything on the screen, make sure you connected your monitor to the computer securely. See "Connecting a Monitor" in Chapter 1 of the** *Setup Guide* **or your monitor manual for instructions.**

5. **Make sure your monitor and display adapter match, and if you installed a display adapter card, be sure to set the card's switches or jumpers properly. See "Connecting a Monitor" in Chapter 1 of the** *Setup Guide* **and your monitor and display adapter card manuals for instructions.**

6. **If you are running an application program, see if you need to set up the program for the type of monitor and display adapter you have. Also make sure you are using the appropriate monitor and display adapter for your software.**

> **Note**
> **If your application program requires a monitor that supports graphics but you have a monochrome monitor, the results will be unpredictable.**

7. **If you installed a display adapter card (and did not connect it to the feature connector on the main system board), you must set jumper JP7 to disable the built-in VGA adapter or you will not see anything on the screen. You may also need to change the setting of jumper JP5. See "Jumper Settings" in Chapter 3 for instructions.**

8. **If you still have difficulty with your monitor, run the Video adapter diagnostic tests described in Chapter 5. If the diagnostics program indicates an error, contact your monitor dealer.**

Diskette Problems

If you see an error message or have trouble accessing data on a diskette, try the following steps:

1. **You may have inserted the diskette upside-down or it may not be inserted all the way. Remove the diskette from the drive and reinsert it with the label facing up. If the diskette drive has a latch, be sure to turn it down to Secure the diskette in the drive. See Chapter 1 for detailed instructions on inserting and removing diskettes.**

2. **If reinserting the diskette does not solve the problem and you have access to another diskette drive of the same type, place the diskette in the other drive and repeat the operation. If you can read the diskette, the trouble may be in your diskette drive. See "Diskette Drive Problems," below.**

3. **Check to see if you have inserted the right type of diskette. For example, are you trying to read a 1.44MB diskette in a 720KB diskette drive? See "Types of Diskette Drives" in Chapter 1 for more information.**

4. **If your diskette is the right type for your drive, see if it is write-protected. On a 5.25-inch diskette, there may be a write-protect tab over the notch on its side or there may be no notch. On a 3.5-inch diskette, the write-protect switch may be set to the write-protect position or there may be no switch. You cannot alter data on a write-protected diskette. (Some application programs do not function properly if the diskette is write-protected. Check the program manual.) See Chapter 1 for more information.**

5. **Is the diskette formatted? A new diskette must be formatted before you can store data on it. See your operating system manual for instructions on formatting diskettes.**

6. **Did you receive one of the following MS-DOS error messages?**

   `Disk Drive Error: Abort, Ignore, Retry?`

   `Disk error reading drive d:`

   `Disk error writing drive d:`

   If you see one of these messages, make sure the diskette is properly inserted in the drive. If the problem persists, try removing the diskette and reinserting it.

   If the error message still occurs, you may have a defective diskette. Try copying the files from the bad diskette to a new diskette.

7. **If you see no** error **messages but there is something wrong with the data in a file, the operating system or an application program may have updated the storage information on the diskette incorrectly. This is probably the case if you have one of these problems:**

   - ❑ **Part of a file is missing**
   - ❑ **A file includes parts of other files**
   - ❑ **An expected output file is missing.**

   If you are using MS-DOS use CHKDSK to make the necessary repairs; see your MS-DOS manuals for instructions. You may also have some special diagnostic software you can use to check your diskettes.

Diskette Drive Problems

If you see a diskette error message or have difficulty with a diskette drive, follow these steps:

1. **If you have problems with a new diskette drive that your dealer installed for you, consult your dealer about the problem.**

2. **If you installed the drive yourself, did you carefully follow all the instructions in Chapter 4? Review the instructions and check all the cable connections to make sure you have installed the drive correctly.**

3. **Did you run the SETUP program to automatically configure the correct type of diskette drive as part of your system? (See Chapter 2 of the** Setup *Guide* **for instructions.)**

4. **Try running the Diskette drive diagnostic tests described in Chapter 5. If the diagnostics program indicates an error, contact your Epson dealer.**

5. If the diskette drive is making loud or unusual noises, do not attempt any further examination of it. Contact your Epson dealer.

Hard Disk Problems

If you have a problem with a hard disk, it could be the result of improper installation, incomplete disk preparation, or corrupted data. Consult one of the following sections, depending on the problem you are having:

- Installing the drive
- Preparing the drive for use
- Accessing data on the drive.

For example, if you could use the data on your disk in the past but suddenly cannot, see "Accessing Data on the Drive."

> **Caution**
> If your hard disk has data on it, always be sure to back up your data before reformatting or repartitioning the drive. Contact your dealer if you have any questions.

Installing the Drive

If you have problems with a newly-installed drive, check the following:

1. **If your dealer installed the drive, consult that person about the problem.**

2. **If you installed the hard disk in your computer, did you carefully follow all the instructions in Chapter 4? Review the instructions, check all the cable connections, and check the jumper settings on your drive.**

3. **If you installed an IDE hard disk drive, be sure you ran SETUP to update your configuration. Check to make sure you selected the correct drive type and that you enabled the built-in IDE hard disk drive controller. (If you connected the IDE drive to a controller on an option card, be sure you set the built-in controller to Disabled.) See Chapter 2 of the** *Setup Guide* **for instructions.**

4. **If you installed a non-Epson hard disk drive, was it physically formatted by the manufacturer? A blank, new hard disk must be physically formatted (or** *initialized)* **before you can partition it and install an operating system on it. This type of format is usually done by the manufacturer; if yours was not, you must do it yourself. If the drive came with its own format utility, use that program; if not, follow the instructions in Chapter 6.**

   Note that a physical format is different from the software-based type of formatting commands (such as the MS-DOS SELECT or FORMAT commands). See "Preparing the Drive," below, for more information.

Preparing the Drive

Before you can store data on a new hard disk (which has already been physically formatted), you must do the following to prepare it for use:

1. **Run the SETUP program to define your hard disk as part of the computer's configuration. (See Chapter 2 of the *Setup Guide* for instructions.)**

2. **Partition and format the drive for your operating system. If you are using MS-DOS, instructions for performing these procedures are provided in your MS-DOS manuals. If you are using another operating system, follow the instructions that came with it.**

If you do not prepare the drive correctly, you cannot store data on the disk. For example, if you partition the drive and format it for MS-DOS (or for another operating system) but you do not copy the operating system to the drive, you will not be able to load the operating system from the hard disk.

If you are sure the hard disk was installed properly and you prepared it for use as described above but you cannot access the drive, review the instructions in your operating system manuals. Make sure you performed each step in the installation process correctly for your configuration.

If you cannot identify the problem, contact your dealer.

Accessing Data on the Drive

If you have been using your hard disk drive successfully for some time and notice a reduction in performance, the data on the disk may have become fragmented. You may want to back up all your data and then use a disk compaction utility to reorganize the files on your disk. Contact your dealer for information.

If you still have trouble with your hard disk, you can back up your data and physically reformat the disk Then you'll need to reinstall the operating system and copy your files back onto the disk. See Chapter 6 and your operating system manual for instructions.

If you cannot access data on your hard disk or you are receiving read/write errors, the disk may have a physical problem. Contact your dealer.

Software Problems

If you have trouble with an application program, try the following:

1. **If the application program does not start, check that you are following the correct procedure for starting the program, and that it is installed correctly. If you have a hard disk and the program is stored in a directory on that drive, make sure you are logged onto or specifying the correct directory. If you don't have a hard disk, make sure you inserted the correct diskette in drive A.**

2. **Your computer can run at high, low, or automatic speed. While almost all programs work properly at the faster speed, some must run at the slower speed. Check your software manual to see if this is the case, and change the processor speed if necessary. See "Changing the Processor Speed" in Chapter 1 for instructions and information on using copy-protected programs.**

3. **If you entered an MS-DOS command that you want to stop, there are special key combinations you can type to cancel the command. These methods may also work in your application programs:**

   - **Hold down Ctrl and press C**
   - **Hold down Ctrl and press Break.**

4. **An application program can occasionally lock the computer, making it unresponsive to keyboard commands. If your computer does not respond when you type on the keyboard, you can reset it. Follow the instructions in Chapter 1.**

5. **If resetting the computer does not help, remove any diskettes, turn off your system, wait five seconds, and turn it back on. Then restart your application program.**

If none of these solutions solve your software problem, contact the software manufacturer for technical support.

Printer Problems

Below are some general steps to follow if you have difficulty with your printer. If the problem persists and you need more detailed information, check your printer manual.

You see a port error message if you are having trouble with the port to which your printer is connected. If your printer uses the parallel port, you may see error 901; if your printer uses the serial port, you may see error 1101.

1. **If your printer does not work at all, check that the printer has power and is properly connected to the computer. (Also, make sure your printer has paper in it.) See Chapter 1 of the** *Setup Guide* **or your printer manual for instructions.**

2. **Check the printer manual for the printer's correct DIP switch or control panel settings. These settings help a printer communicate properly with the computer.**

3. **If you are using more than one parallel port or more than one serial port, the computer must know which port is the primary port and which is the secondary port. See Chapter 2 of the** *Setup Guide* **for instructions on how to set the parallel and serial ports using the SETUP program.**

4. **If your printer is properly set up but is still not functioning, test it from the MS-DOS level. When the screen displays the MS-DOS command prompt (such as C> or A>), hold down Shift and press Print Screen. This should print the contents of the screen on your printer.**

   If it does not, you may need to change the internal setting of the computer's parallel port for a parallel printer (or serial port for a serial printer). To do this, use the MS-DOS MODE or SETMODE command. See your printer manual and the MS-DOS manuals for more details.

5. **Many application programs (such as word processors) must be set up properly before they can use a printer. Check your program manual to see what customizing may be required.**

6. **If you are using an application program that requires a printer driver, make sure the correct driver is installed. See your application program manual for instructions. Also see your printer manual for additional instructions on using your printer with application programs.**

7. **Try running the Parallel port diagnostic test if you have a parallel printer, or the Serial port test if you have a serial printer. You can also test a dot-matrix printer, if you have one. Chapter 5 describes these tests. If the test(s) indicate(s) an error, contact your printer dealer.**

Option Card Problems

If you install an option card and it does not function properly, check the following:

1. **Is the option card installed correctly? Make sure it is well-seated in its slot. Check the installation procedure described in Chapter 3 and also see the instructions that came with the card.**

2. **Did you set the necessary DIP switches or jumpers on the option card? See the card's manual for instructions.**

3. **Did you set the necessary jumpers on the main system board? See Chapter 3 for more information.**

4. **Did you run the SETUP program to update your computer's configuration after installing the card? See Chapter 2 of the** *Setup Guide.*

5. **If you used the option card to add an external device to your computer, did you use the proper cable to connect the device to the card?**

6. **Did you perform the correct setup procedures for the software you are using with the option card? See your option card or software manual for instructions.**

Mouse Problems

If you have trouble with your mouse or you see an auxiliary device error message, check the following:

1. **Make sure the mouse cable is securely connected to the mouse port and not the keyboard port. See Chapter 1 of the** *Setup Guide* **for instructions.**

2. **If you installed a mouse on an option card, be sure to set jumper JP3 to disable the built-in mouse and set jumper JP4 enable the mouse on the card. See Chapter 3 for instructions.**

3. **Did you install the mouse driver correctly? See your software manual and the documentation that came with your mouse for instructions.**

Memory Module Problems

If you added extra memory to your system by installing SIMMs and that memory is not operating properly, check the following:

1. **If the memory count displayed by the power-on diagnostics program is incorrect, you or your dealer may not have installed the SIMMs correctly. They may be installed in the wrong sockets, they may be the wrong type of SIMM, or they may not be inserted all the way.**

   If your dealer installed SIMMs for you, contact your dealer; do not attempt to correct the problem yourself. If you installed them, see "Memory Modules" in Chapter 3 and make sure you followed all the instructions.

2. **be sure to run the SETUP program after you install or remove memory modules to automatically update your memory configuration. See Chapter 2 of the** *Setup Guide* **for instructions.**

3. **If you still have trouble with your SIMMs, write down any error messages that appear and contact your dealer.**

Math Coprocessor Problems

If the math coprocessor in your system does not seem to be operating properly, check the following:

1. **Run the SETUP program to make sure the math coprocessor is listed as Yes in the Installed equipment information. If it is listed as No (not installed), you or your dealer may have installed the math coprocessor incorrectly. See Chapter 2 of the** *Setup* Guide **and Chapter 3 of this manual for more information.**

2. **If your math coprocessor is listed correctly in SETUP but still does not seem to be working, test it by running the Numeric coprocessor diagnostic test described in Chapter 5.**

> **Caution**
> **If you need to remove a math coprocessor, contact your dealer; you must not attempt to remove it without a special extraction tool.**

Appendix A
Specifications

CPU and Memory

CPU (on card)	**486SX/25 card: Intel 486SX, 25 MHz microprocessor soldered on CPU card; additional socket for optional Intel ODP486SX/25 Over-Drive module to double internal clock speed (50 MHz); OverDrive module cannot be installed if 487SX/25 microprocessor chip is installed in shared socket** **486DX/33 card: Intel 486DX,33 MHz microprocessor socketed on CPU card; additional socket for optional Intel ODP486DX/33 OverDrive module to double internal clock speed (66 Mhz)** **486DX2/66 card: Intel 486DX2,66 MHz microprocessor socketed on CPU card; additional socket for optional (future) Intel OverDrive module**
System speed	**High, low, and automatic speeds available; high speed is CPU-dependent, low speed is simulated 8 MHz speed, automatic speed switches from high to low only for diskette drive access; speed selection through SETUP, keyboard command, or ESPEED program; 0 wait state memory access at high speed**

Memory	**4MB RAM standard soldered on main system board; expandable using 1MB, 4MB, 16MB, or 64MB SIMMs to 68MB (maximum); SIMMs must be 36-bit, fast-page mode type with 70 ns (or faster) access speed**
ROM	**128KB system BIOS ROM and SETUP code located in FLASH memory device on CPU card; 64KB boot ROM contained in EPROM on main system board**
video RAM	**1MB VRAM on main system board; additional 1MB VRAM on optional enhanced video daughterboard (2MB VRAM maximum)**
Shadow RAM	**Automatic shadowing of system and VGA BIOS ROM into RAM; shadow RAM address control selectable through SETUP**
Cache	**8KB of internal cache (built into the microprocessor); cache testing and address control selectable through SETUP**
Virtual cache	**Epson proprietary VirtualCache feature automatically creates a "virtual cache" buffer the size of maximum system memory**

Math coprocessor	**486SX/25 card: socket for optional Intel 487SX, 25 MHz microprocessor chip with built-in math coprocessor; microprocessor chip cannot be installed if OverDrive module is installed in shared socket** **486DX/33 card: math coprocessor built into the 486DX microprocessor; additional socket for optional Weitek 4167,33 MHz math coprocessor** **486DX2/66 card: math coprocessor built into the 486DX2 microprocessor; additional socket for optional Weitek 4167, 33 MHz math coprocessor**
Clock/ calendar	**Real-time clock, calendar, and CMOS RAM socketed on main system board; separate battery backup**
OverDrive Module	**486SX/25 card: socket for optional Intel ODP486SX/25 OverDrive module to double internal clock speed (50 MHz); module cannot be installed if 487SX/25 microprocessor chip is installed in shared socket** **486DX/33 card: socket for optional Intel ODP486DX/33 OverDrive module to double internal clock speed (66 MHz)** **486DX/66 card: socket for optional (future) Intel OverDrive module**

Controllers

Video	**Chips and Technologies Wingine VGA controller on main system board; Brooktree® RAMDAC on video daughterboard provides resolutions up to 1024 x 768; optional enhanced video daughterboard provides resolutions up to 1280 x 1024 and 24-bit true color display**
Diskette	**Controller on main system board supports up to two diskette drives and one tape drive**
Hard disk	**Interface on main system board supports up to two IDE hard disk drives with built-in controllers**

Interfaces

Monitor	**VGA interface built into video daughter-board for analog or multifrequency VGA monitor; 15-pin, D-shell connector**
Parallel	**One standard 8-bit parallel, mono- or bi-directional interface built into main system board; port assignment and I/O address selectable through SETUP; 25-pin, D-shell** connector
Serial	**One RS-232C, programmable, asynchronous interface built into main system board; port assignment and I/O address selectable through SETUP; 9-pin, D-shell connector**

Keyboard	**PS/2 compatible keyboard interface built into main system board; keyboard speed, delay, and num lock settings selectable through SETUP; 6-pin, mini DIN connector**
Mouse	**PS/2 compatible mouse interface built into main system board; 6-pin, mini DIN** connector
Option slots	**Six standard 16-bit I/O expansion slots; ISA compatible; 8 MHz bus speed**
Speaker	**Internal; operation controllable through SETUP and volume selectable by software**
Alternate VGA	**IBM compatible VGA pass-through interface built into main system board; 26-pin connector**
Mass Storage	**Up to five drives maximum; one full-height or two half-height internal drives; one third-height and two half-height, or one third-height and one full-height, externally-accessible drives**
Keyboard	**Detachable; two-position height; 101 or 102 sculpted keys; country-dependent main typewriter keyboard; numeric /cursor control keypad; four-key cursor control keypad; 12 function keys**

Power Supply

Type	**200 Watt, fan-cooled, automatic input voltage sensing thermally protected**
Input ranges	**98 to 132 VAC and 195 to 264 VAC**
Maximum outputs	*+5* **VDC at 22 Amps, +12 VDC at 6.8 Amps, -5 VDC at 0.5 Amps, -12 VDC at** *0.5* **Amps**
Frequency (Europe only)	*47* **to 63 Hz**
Cables	**Three to main system board; five to mass storage devices**

Option slot power limits

Maximum current	+5 Volts	+12 volts	-5 Volts and -12 Volts
For each slot	7 Amps	1.5 Amps	0.5 Amps
For all six slots	16 Amps	3 Amps	0.5 Amps

Environmental Requirements

Condition	Operating range	Non-operating range	Storage range
Temperature	41° to 95° F (5° to 35°C)	14° to 140° F (-20° to 60°C)	-4° to 140° F (-20° to 60°C)
Humidity (non-condensing)	20%to80%	10% to 90%	10% to 95%
Altitude	–300 to 9,900 ft (-100 to 3,000 m)	-300 to 11,860ft (-100 to 3,600 m)	-300 to 39.400 ft (-100 to 12,000 m)
Maximum wet bulb	68° F (20°C)	104°F (40°C)	134°F 57°(C)

Physical Characteristics

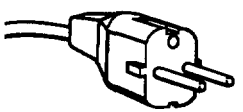
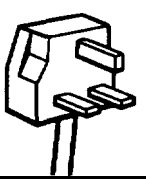
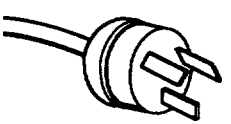
Width	**17 inches (432 mm)**
Depth	**16 inches (406 mm)**
Height	*6* **inches (153 mm)**
Weight	**Single diskette drive model (without keyboard): 26 lb (11.8 kg)**

Power Source Requirements

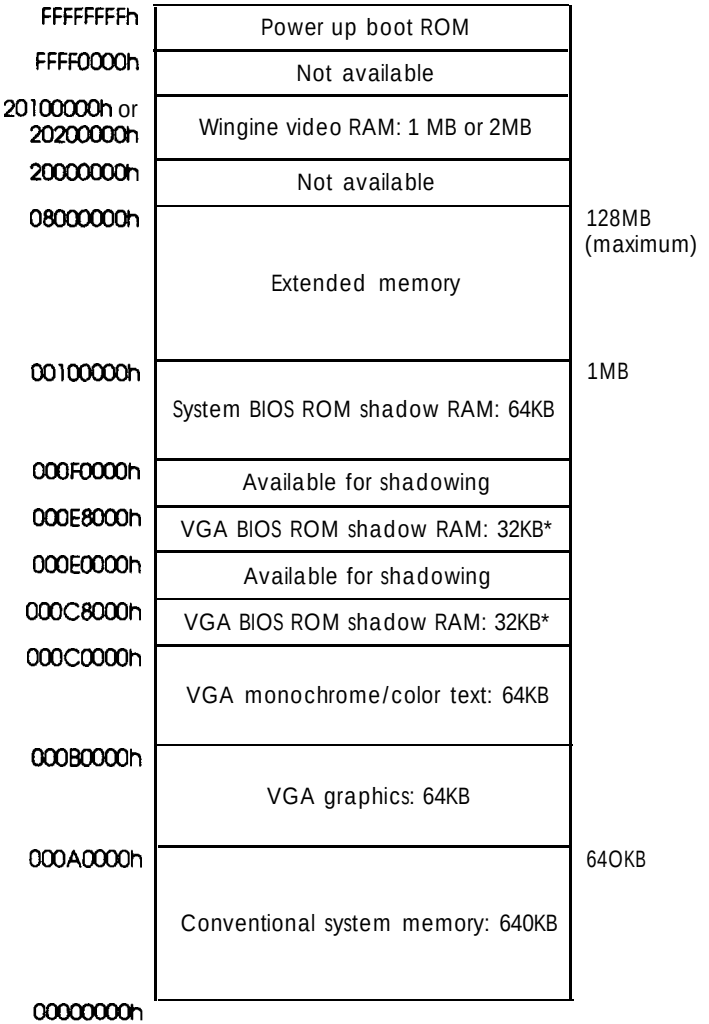
120 Volt power source requirements

AC plug	*Plug type*	Reference standards	Power cord
	North America 125V, 10A	ANSI C73.11, NEMA 5-15-P. IEC 83	UL/CSA Listed. Type SJT, no. 18/3AWG. or no. 16/3AWG. or <HAR> 300V, 10A or 13A

240 Volt power source requirements

AC plug	*Plug type*	Reference standards	Power cord
	Europe 240V, 10A to 16A	CEE 7/7 IEC 83 IEC 127 HD 21	<HAR> 1.00 mm² 300V, 10A
	UK 240V, 10A	BS 1362 BS 1363A IEC 83 IEC 127 HD 21 EN 60 320-1 ASTA mark	<HAR> 1.00 mm^2 300V. 10A
	Australia 240V, 10A	AS C112 IEC 127 HD 21	<HAR> 1.00 mm² 300V, 10A
	North America 24OV. 15A	ANSI C73.20. NEMA 6-15-P. IEC 83 UL 198.6	UL/CSA Listed Type SJT no. 18/3AWG. 300V. 10A

System Memory Map



- Only one of these address blocks is used to shadow the VGA BIOS ROM. The default starting address is 000C0000h; address 000E0000h is selectable using SETUP.

Extended VGA modes

Mode*	Size	Type	color	DotCLK	MemCLK	Mode type
60	132 x 25	Text (8 x 16)	16	40 MHz	56 MHz	NI
61	132 x 50	Text (8 x 8)	16	40MHz	56 MHz	NI
62	132 × 43	Text (8 × 8)	16	40 MHz	56MHz	NI
64	80 × 43	Text (8 × 8)	16	25 MHz	56MHz	NI
65	80 × 50	Text (8 × 8)	16	25 MHz	56 MHz	NI
6A/70	800 × 600	Planar	16	40 MHz	56 MHz	NI
72	1k × 768	Planar	16	45 MHz	56 MHz	I
78	640 × 400	PackPixel	256	50 MHz	56 MHz	NI
79	640 × 480	PackPixel	256	50 MHz	56MHz	NI
7C	800 × 600	PackPixel	256	72 MHz	65MHz	NI

* These modes require 512KB of video memory (mapped Into VGA memory).
NI = Non-interlaced
I = Interlaced

Wingine Modes

Mode*	Size	Type	Color	DotCLK	MemCLK	Mode type
30	640 x 480	PackPixel	256	25 MHz	56 MHz	NI
32	800 x 600	PackPixel	256	40 MHz	56 MHz	NI
34	1k x 768	PackPixel	256	65 MHz	56 MHz	NI
36	1k x 768	PackPixel	256	45 MHz	56 MHz	I
3A	1280 x 1k	PackPixel	256	75 MHz	56 MHz	I
40	640 x 480	PackPixel	15 bit	50 MHz	56 MHz	NI
41	640 x 480	PackPixel	16 bit	50 MHz	56 MHz	NI
42	800 x 600	PackPixel	15 bit	50 MHz	56 MHz	NI
43	800 x 600	PackPixel	16 bit	50 MHz	56 MHz	NI
50	640 x 480	PackPixel	24 bit	75 MHz	56 MHz	NI

* These modes require 1MB of video memory (mapped Into extended memory), except modes 3A and 50, which require 2MB of video memory.

NI = Non-interlaced

I = Interlaced

Glossary

Access *speed*

The length of time it takes for an information storage device, such as memory or a disk drive, to return a piece of data requested by another device. For example, your computer's SIMMs return data requested by the microprocessor at an access speed of 70 ns (nanoseconds).

Address

A number or name that identifies the location where information is stored in a computer's memory.

Analog monitor

A monitor that generates, responds to, or acts upon analog data, such as a VGA monitor. Analog data is transmitted by varying the voltage levels in a continuous current and can produce an infinite number of colors or gray shades.

Application program

A software program designed to perform a specific task, such as word processing or creating spreadsheets. Note that an application program is different than an operating system, which controls all the hardware and software in your computer. See also Operating system.

ASCII

American Standard Code for Information Interchange. A standardized numeric coding system for representing characters, such as numbers, letters, and graphic symbols. Each of the 256 ASCII codes occupies one byte of storage. All computers, printers, and programs can use files transmitted in standard ASCII code. Extended ASCII codes can be used only by hardware and software designed to interpret them.

Asynchronous

A method of data transmission in which one machine sends data, one character at a time, to another machine at variable intervals that do not need to be synchronized to a timing device, such as a system clock.

AUTOEXEC.BAT file

The batch file your computer runs automatically whenever you load MS-DOS. It configures the installed system devices and sets various user preferences. See also Bach file.

Automatic speed

The processor speed setting that **allows the computer to switch automatically from high speed to low speed when it accesses a diskette drive. See also Copy-protected** *program* **and Key** *disk.*

Backup

An extra copy of a program, data file, or disk, that is created in case your working copy is damaged or lost.

Base memory

see Conventional Memory.

Botch file

A type of file that executes a series of commands automatically. Batch files are text files with the filename extension .BAT. When you type the filename, your operating system executes all the commands in that file sequentially.

BIOS

Basic Input/Output System. Routines in ROM (Read Only Memory) that handle the transfer of information among various hardware components, and between the hardware and your operating system and other software.

Bit

A binary digit (0 or 1). The smallest unit of information a computer can process and store. The value of a bit represents a single electrical pulse through a circuit, or a small spot on a disk, that contains either a 0 or a 1.

Boot

The process a computer performs to start itself up, check its components, and then load the operating system into its memory.

Bus

A wire or group of wires that sends information from component to component in the computer. The speed of a bus increases by the number and width of the channels the bus uses to move data.

Byte

A sequence of eight bits of data that represent one character. See also *Bit* and Character.

Cache

A high-speed type of memory buffer that stores frequently used data where your microprocessor can access it faster. Your computer includes 8KB of internal cache as well as VirtualCache. See also *VirtualCache.*

CGA

Color Graphics Adapter. A type of display adapter card that can generate up to 25 lines of text with 80 characters on each line, two-color graphics at 640 x 200 resolution, or four-color graphics at 320 x 200 resolution.

Character

Anything that can be printed in a single space on the page or the screen; includes numbers, letters, punctuation marks, spaces, formatting codes, and graphic symbols that are represented to the computer by one byte of data. See also Byte.

Chip

A piece of silicon containing many miniature transistors and resistors wrapped in insulating material. Chips process electrical signals sent to them and then transmit the processed signals to the computer system. Also called an integrated circuit. See also CPU.

CMOS

Complementary Metal-Oxide Semiconductor. A type of low-power silicon chip used for RAM and switching applications that is backed up by a battery.

Code

A system of symbols for representing data or instructions; also any software program or part of a program.

Command

An instruction you enter or select to direct a computer program to perform a specific function.

Command prompt

The symbol or message that displays on the screen to tell you that the operating system is loaded and ready to receive instructions. The default MS-DOS command prompt displays the current drive and directory. If you are logged onto drive *C*, the command prompt may look like this: `C:\>`.

Configuration

The particular setup of your computer's internal and external components. A typical configuration consists of a computer with a certain amount of memory, one diskette drive, and one hard disk drive connected to a monitor, printer, and keyboard.

Control code

A command (generated when you hold down Ctrl and press another key on the keyboard) that instructs the computer to perform a specific function.

Conventional memory

The memory in the computer below 1MB that is available to MS-DOS and application programs-usually 640KB. Also called base memory or main memory.

Copy-protected program

A program containing a software "lock" that prevents it from being copied. Some of these programs require you to leave the program diskette in the drive while you use it. See also *Automatic speed* **and** *Key disk.*

Coprocessor

See Math coprocessor.

CPU

Central Processing Unit. The primary computer device that interprets instructions, performs the tasks you indicate, keeps track of stored data, and controls all input and output operations. See also *Microprocessor.*

Cursor

The highlighted marker or pointer that shows the screen position at which keystrokes will appear when typed or where the next mouse command will be executed.

Cylinders

The vertical alignment of tracks in a hard disk that can be lined up under one read/write head. The number of tracks on a disk is equal to the number of cylinders times the number of heads. *See also Tracks.*

Data

Information, such as text or graphics, stored or processed by a computer.

Data diskette

A formatted diskette on which you store data files (as opposed to program files).

Default

Any value or setting choice that the computer or a program makes when the user does not specify an alternative. A default value stays in effect unless you override it temporarily by changing the value or you reset the default value itself.

Device

A piece of equipment that is part of a computer system and performs a specific task, such as a disk drive, a monitor, or a printer.

Device driver

A file containing instructions that allow your computer to recognize and communicate with a device. The device may be a printer, monitor, or other type of device.

Diagnostics

See *System diagnostics* **and** *Power-on diagnostics.*

DIP switch

Dual Inline Package switch. A small rocker- or sliding-type switch on the circuit board of a device that controls a particular function.

Directory

A group of files stored in a particular area on a disk. A directory listing shows the name, location, and size of the files in the directory. A directory can contain both files and subdirectories.

Disk

The collective term for diskettes and hard disks, the devices on which the computer stores data magnetically.

Disk drive

The electromechanical device that reads data from and writes data to a disk, tape, or other storage media. A diskette drive accepts removable diskettes in its disk slot while a hard disk is sealed inside a protective casing.

Diskette

A flat piece of flexible plastic coated with magnetic material used to store the data written to it by the diskette drive. A diskette can be transferred from one computer to another.

Display adapter card

A circuit board that can be installed in one of the computer's option slots to control the way a monitor displays text and graphics. A VGA display adapter is built into your computer's main system board and video daughterboard. Also called video card.

DOS

Disk Operating System. The generic term for the operating system software that controls a computer and directs its input and output functions. See also MS-DOS and Operating system.

Double-density

A type of diskette format that allows you to store twice as much data as the standarddensity format. A 5.25-inch double-density diskette can store 360KB of data. A 3.5-inch double-density diskette can store 720KB of data.

Drive designator

The letter name of a disk drive, followed by a colon-for example, C : .

EGA

Enhanced Graphics Adapter. A type of display adapter card that allows you to display high-resolution graphics on an EGA monitor. It can display up to 43 lines of text with 80 characters on each line, or it can display monochrome or X-color graphics at resolutions up to 640 x 350.

Expanded memory

Memory that specially-written MS-DOS programs can use when an expanded memory manager program maps that memory into an accessible area. See also *LIM EMS 4.0.*

Extended memory

Memory above 1MB that is accessed by the 386 or 486 microprocessors when they are operating in protected or virtual mode. This memory is available to OS/2 programs, but is available to MS-DOS only if an extended memory manager program is installed. See also Expanded memory and OS/2

Extension

A suffix of up to three characters which you can add to a filename to identify its contents or purpose. Some programs automatically create an extension for a filename when you create a file using the program.

File

A collection of information called records, or entries, stored together on a disk under a single name. Text files consist of words and sentences. Program files consist of codes and are used by computers to interpret and execute commands. See also *Filename.*

Filename

A name assigned to a file that distinguishes it from other files in a particular directory on a disk. MS-DOS filenames can be up to eight characters long and consist of letters, numbers, and certain punctuation marks.

Fixed disk

See Hard disk.

Format

To prepare a new disk (or an old one you want to reuse) so that the data you store on it can be used by your operating system. Formatting divides a disk into tracks and sectors and creates addressable locations where your operating system can find your data.

Graphics

Screen or file data such as lines, angles, and curves. A graphics program creates images by joining individual pixels on the screen to represent virtually any shape desired.

Hard disk

An encased storage device containing one or more disk platters used to store large amounts of data. Unlike a diskette, a hard disk is fixed in place. It can process data more rapidly and store many more files than a diskette. Also called fixed disk.

Hardware

Any physical component of a computer system, such as a monitor, printer, keyboard, main system board, disk drive, or CPU.

Hexadecimal

A base-16 numbering system frequently used by programmers to represent the binary numbers used by the computer. Any decimal number between 0 and 255 can be expressed by a two-digit hexadecimal number consisting of the numbers 0 through 9 and the letters A through F. Hexadecimal numbers are usually followed by the letter H (or h) to differentiate them from decimal numbers.

High-density

A type of diskette format that allows you to store more data than on single- or double-density diskettes. A 5.25-inch high-density diskette can store 1.2MB of data. A 3.5-inch high-density diskette can store 1.44MB of data.

IDE

Integrated Drive Electronics. A type of hard disk drive interface in which the controller is located on the drive, instead of on a controller card. Your computer includes an interface for up to two IDE hard disk drives on the main system board.

Input/output (I/O) port

see Port.

Interface

A physical or software connection used to transmit data between equipment or programs so they can work with each other.

Jumper

A small moveable plug that connects two pins on a device's circuit board. Jumpers can be used to alter the operation of a particular function.

Key disk

A diskette containing a copy-protected program and that must remain in a diskette drive while you use the program. See also Copy-protected program.

Kilobyte (KB)

A unit used to measure storage space in a computer's memory or on a disk. One kilobyte equals 1024 bytes. See also Byte.

LIM EMS 4.0

Version 4.0 of the Lotus/Intel/Microsoft Expanded Memory Specification-a description of a capability your computer has for supporting programs that use expanded memory. See also *Expanded Memory.*

Main system board

The board built into your computer containing the circuitry and the primary components your computer needs to operate. Other boards, such as option cards, can be installed in the option slots (bus connectors) on the main system board. Also called motherboard.

Math coprocessor

An optional device that enables the computer to process mathematical calculations faster by using floating point numbers instead of whole numbers. This speeds up certain **math and graphics operations performed by programs that use this type of calculation.**

MCGA

Multi-color Graphics Array. A type of display adapter that emulates a color graphics adapter (CGA). MCGA provides two additional modes: 640 x 480 in two colors and 320 x 200 in 256 colors. See also *CGA.*

MDA

Monochrome Display Adapter. A type of display adapter that displays in 80 column by 25 line text mode in only one color, such as green or amber.

Megabyte (MB)

A unit used to measure storage space in a computer's memory or on a disk. One megabyte equals 1024KB (kilobytes). See also *Byte.*

Megahertz (MHz)

A unit used to measure oscillation frequency, such as that of a computer's internal clock. A megahertz is one million cycles per second.

Memory

The circuitry in your computer that stores data for possible retrieval. Memory contents are stored permanently (in ROM) or temporarily (in RAM).

Memory module

A small circuit board that contains surface-mounted memory chips. You can add memory modules to the main system board to expand your computer's memory. Commonly called a SIMM (single inline memory module).

MGA

Multi-mode Graphics Adapter. A type of display adapter card that can display monochrome text and color graphics on the screen.

Microprocessor

A small CPU contained on one semiconductor chip. See also CPU.

Modem

MOdulator/DEModulator. A device that allows a computer to transfer data to and from another computer by transmitting signals over telephone lines.

Monitor

The hardware device that contains the video screen and displays images produced by your computer's display adapter.

Monochrome monitor

A monitor that displays in only one color (such as green, white, or amber), as opposed to a color monitor which can display in many different colors.

Mouse

A hand-held pointing device with one or more buttons. When you slide the mouse over a surface in a certain direction, the cursor moves in the same direction on the screen. Pressing (or clicking) a mouse button selects the item on the screen at the cursor position.

MS-DOS

Microsoft Disk Operating System. The operating system most commonly used with your computer. MS-DOS is a command-based, single-user, single-tasking operating system. See also *DOS, OS/2,* **and** *Operating system.*

Multifrequency monitor

A monitor that accepts input at different frequencies and can display in a variety of resolutions.

Multitasking

The ability of a computer and an operating system to work on more than one command or task at a time. The tasks are actually not performed at the same time, but assigned priorities and rapidly processed by the computer in sequential order. See also OS/2 and UNIX.

Network server

The main computer in a network which controls access to the rest of the network computers (called workstations). The server also provides mass storage, programs, and other resources to the workstations.

Network server mode

An optional password mode that provides special security if you are using your computer as a network server. See also Password.

Numeric keypad

The number and cursor control keys grouped to the right of the keyboard. The operation of the dual-use keys on the numeric keypad is controlled by the Num Lock key.

Operating speed

The speed at which the computer's processor can execute commands, usually expressed in megahertz (MHz), such as *33* **MHz. See also** *Megahertz.*

Operating system

A collection of programs that manages a computer's operations, such as interpreting input, managing files, and reading and writing data to disk. The operating system (such as MS-DOS, OS/2, or UNIX) provides the foundation for the other programs you use and controls the usage of the hardware resources.

Option card

A circuit board you can install inside the computer to provide additional capabilities, such as a modem or an additional I/O port. Option cards plug directly into the special option slots so you do not have to alter a computer's circuitry to enhance your system. See also Bus.

OS/2

Operating System /2. The enhanced operating system developed jointly by Microsoft and IBM that provides protected mode processing and multitasking capabilities. See also *DOS, MS-DOS,* **and** *Operating system.*

Parallel

The type of interface that transmits all the bits in a byte of data simultaneously over separate wires in a cable. See also Interface and Serial.

Parameter

A qualifier added to a command that tells your operating system what data to process, where it should locate or store a file, or how it should operate. See also *Stitch.*

Parity

A method used to verify the accuracy of data transmissions by making the total of the number of l's in a group of bits odd (odd parity), even (even parity), or none (no parity).

Partition

(1) The area an operating system defines on a hard disk so you can use that area as though it were a physically separate device; *(2)* **to divide a hard disk into separate logical areas. You can create a primary partition and one or more extended partitions on a hard disk.**

Password

The unique sequence of characters you type after you turn on or reset the computer in order to access and use your system. In a computer network, a password may also set certain access privileges to restrict the operations you can perform.

Pathname

The directory name(s) you specify to locate a file. For example, the pathname for the file SALES, stored in the subdirectory BUSINESS, is \BUSINESS\SALES.

Peripheral device

An external device (such as a printer or a modem) connected to a computer that depends on the computer for its operation.

Port

A physical input/output socket on a computer to which you can connect a peripheral device.

Power-on diagnostics

Tests stored in a computer's ROM that the computer runs to check its internal circuitry, peripheral device configuration, and operating status each time you turn it on or reset it.

Processor speed

See Operating speed.

Program

A file containing coded instructions that tell the computer what to do and how to do it. See also File.

Prompt

A message displayed by the operating system or a program to request information from you or tell you what action to perform next. See also Command prompt.

RAM

Random Access Memory. The portion of the computer's memory used to run programs and store data while you work. All data stored in RAM is erased when you turn off or reset the computer; so you must store any data you want to keep on disk.

Read

To gather data from one source (such as a disk) and transfer it to a device (such as a monitor screen or a printer). For example, when you open a text file stored on disk, the computer reads the data from the disk and displays it on the screen. See also *Write.*

Read/write head

The physical device inside a disk or tape drive that reads data from and writes data to the magnetic surface of the disk or tape.

Real-time clock

A clock inside the computer that keeps track of the time and date, even when the computer is turned off, by using power from a backup battery.

Refresh rate

The frequency with which a monitor can redraw a screen image. The faster the refresh rate, the less the screen will flicker. The Wingine video controller in your computer provides extremely fast refresh rates, up to 72 Hz.

Reset

To restart a computer without turning it off. You can reset your computer by pressing Ctrl Alt Delete **(warm reset) or the RESET button (cold reset). Resetting erases all data stored in RAM and reloads your operating system.**

ROM

Read Only Memory. A portion of memory that can only be read and cannot be modified. ROM retains its contents even when you turn off the computer by using power from a backup battery.

Roof directory

The highest or main directory in a hierarchical disk directory structure. All other directories are subdirectories of the root directory. MS-DOS designates the root directory with a \ (backslash).

RS-232C

A widely used, standard type of serial communication. You can connect an RS-232C device to the computer's built-in RS-232C serial port.

Sector

A small section of a disk track (typically 512 bytes long) that provides an address at which the computer can store and retrieve data. See also *Track.*

Self test

see Power-on diagnostics.

Serial

The type of communication that transmits data from a serial interface to a serial device, one bit at a time, over a single wire. See also *Interface* **and** *Parallel.*

Shadow RAM

The feature in your computer that automatically copies the contents of the system, video, and any external BIOS ROMs into the RAM area of memory to speed up processing.

SIMM

See *Memory module.*

Software

The collection of instructions (or programs) that tell your computer hardware to perform the tasks and functions you specify. See also Hardware and *Program.*

Subdirectory

In a hierarchical disk directory structure, a group of files in a directory that is contained within another directory or the root directory.

Switch

An optional specifier added to an MS-DOS command that modifies the way the command works. Switches are typically preceded by a / (forward slash). See also Command and *Parameter.*

System diagnostics

A series of tests you can perform on the computer's components and some peripheral devices to make sure they are functioning correctly.

System diskette

A diskette that contains the operating system and that can be used to boot the computer.

Tape drive

The physical device that allows you to insert large-capacity magnetic tape cartridges for compact data storage and backup.

Tracks

Addressable, concentric circles on a disk, resembling the grooves on a record, which divide the disk into separate accessible areas. On a tape cassette, the tracks run parallel to the edge of the tape. See also *Sector.*

UNIX

A powerful operating system that supports multitasking and is especially suited to multi-user environments. UNIX is compatible with a range of computers, from personal computers to mainframes. See also *Operating system.*

VGA

Video Graphics Array. A type of high-resolution display adapter that provides a variety of video modes. Your computer's VGA controller and video daughterboard support resolutions up to 1024 x 768 (or up to 1280 x 1024 with the enhanced video daughterboard) on a compatible monitor.

Video card

See Display adapter card.

VirtualCache

The Epson proprietary feature that automatically creates a "virtual cache" buffer the size of your installed system memory to speed up data access. See also *Cache.*

Write

To transfer data to a storage device (such as a disk) or an output device (such as a monitor or printer). Data written to a disk is stored for later retrieval; data written to a monitor is not stored. See also *Read.*

Write-protect

To protect the data on a diskette from being changed by placing a write-protect tab over the notch on a 5.25-inch diskette or by setting the write-protect switch on a 3.5-inch diskette. You can also write-protect a file on a disk by using software to designate the file read-only. When a diskette or file is write-protected, you cannot erase, change, or record over its contents.

Index

D

N

O

P

R

S

T

U

V

W

X

Epson Overseas *Marketing Locations*

Epson Deutschland GmbH
Zülpicher Straße 6,
4000 Düsseldorf 11
Germany
Phone: 211-56030
Telex: 41-8584786

Epson (U.K.) Ltd.
Business Management Dept. (PC)
Campus 100, Maylands Avenue
Hemel Hempstead, Hertfordshire,
HP2 7EZ, UK
Phone: 0442 61144
Free phone: linkline 0800 289622
Fax: 0422 227227
Telex: 51-824767

Epson Iberica, S.A.
Avda. de Roma 18-26
08290 Cerdanyola del valles
08036 Barcelona, Spain
Phone: 3-582-15-00
Fax: 3-582-15-55
Telex: 50129

Epson Electronics Trading Ltd.
Taiwan Branch
10F, No. 287, Nanking E. Road,
Sec. 3, Taipei, Taiwan R.O.C.
Phone: 886-2-71 7-7360
Free phone: 886-080-211172
Fax: 886-2-712-9164
Telex: 785-24444

Epson Singapore Pte. Ltd.
No. 1 Raffles Place #26-00,
Oub Centre, Singapore 0104
Phone: 533-0477
Telex: 87-39536

Epson France S.A.
B.P. 320, 68 Bis Rue Marjolin
92305 Levallois-Perret Cedex
France
Phone: 33-1-4737-3333
Telex: 42-610657

Epson Italia s.p.a.
V.le F.lli Casiraghi, 427
20099 Sesto S. Giovanni
Milano, Italy
Phone: 2-262331
Fax: 2-2440641 or 2-2440750
Telex: 315132

Epson Australia Pty. Ltd.
17 Rodborough Road
Frenchs Forest, N.S.W. 2086
Australia
Phone: 2-452-0666
Fax: 2-451-0251
Telex: 71-75052

Epson Hong Kong Ltd.
25/F., Harbour Centre,
25 Harbour Road
Wanchai, Hong Kong
Phone: 831-4600
Fax: 572-5792
Telex: 65542 EPSCO HX